# QUARRY ACCIDENTS

IN THE

## UNITED STATES

DURING THE CALENDAR YEAR

## 1931

BY

### WILLIAM W. ADAMS

# CONTENTS

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## INTRODUCTION

The quarry industry in the United States during the calendar year 1931 had a better safety record than it has experienced since 1913. The record was doubtless also more favorable than that of the 3 years immediately preceding 1914, as many accident reports from operators for those early years were probably incomplete as regards minor injuries because the companies had not begun to keep records of all accidents at their plants.

In 1931 the rate for fatal accidents was lower than ever before, and the nonfatal-injury rate, with the above qualification, was also the lowest that the industry has known.

Fewer men were employed in 1931 than in any other year except 1918, the number shown by the returns from operating companies being 14 percent less than in 1930 and only 1 percent more than in 1918. Of the 69,200 men working at quarries and outside plants, 33,221 worked in the quarries and 35,979 were employed outside the quarries. The number of man-shifts worked by all employees was one fourth less than in 1930, and the average period of employment (224 days per man) was 31 days less per man than in the previous year.

Accidents at the quarries and at outside plants associated with them caused 61 deaths and 5,427 nonfatal injuries, an injury being counted as any disability of an employee for more than the remainder of the day on which the accident occurred. For each million man-hours of exposure of the employees to the hazards of their occupations the fatality rate [3] was 0.46 and the injury rate 40.58, a combined rate of 41.04 for fatal and nonfatal accidents. The combined rate for accidents inside the quarries was 61.12 and that for accidents at outside plants, such as crushers, cement and lime plants, and rock-dressing plants, 26.43.

The relative standing of the principal quarrying States (those in which 1,000 or more men were employed at the quarries and outside plants) is shown in table 1. The States are listed in the order of their accident rates and according to the number of men employed.

In six States in table 1 the quarries were operated without a fatal accident. These States were Alabama, New Jersey, Minnesota, Kentucky, Wisconsin, and North Carolina. Ten other States listed in the table had lower fatality rates than the average for the United States. The rates for nonfatal injuries in 18 States were lower than the average for the country as a whole.

TABLE 1.—*Relative standing of States having 1,000 or more men employed at quarries, including outside works, classified according to number of men employed, and fatality and injury rates per million man-hours, during the year ended Dec. 31, 1931*

| Relative standing | State | Number of men employed | Relative standing | State | Fatality rates | Relative standing | State | Injury rates |
|---|---|---|---|---|---|---|---|---|
| 1 | Pennsylvania | 11,752 | 1 | Alabama | | 1 | Illinois | 24.16 |
| 2 | Ohio | 4,844 | 2 | New Jersey | | 2 | Michigan | 24.34 |
| 3 | New York | 4,090 | 3 | Minnesota | | 3 | West Virginia | 25.41 |
| 4 | Indiana | 3,927 | 4 | Kentucky | | 4 | Tennessee | 25.77 |
| 5 | California | 3,428 | 5 | Wisconsin | | 5 | Georgia | 27.08 |
| 6 | Illinois | 3,162 | 6 | North Carolina | | 6 | Texas | 27.98 |
| 7 | Missouri | 3,056 | 7 | Indiana | 0.17 | 7 | New Jersey | 29.86 |
| 8 | Vermont | 3,006 | 8 | Massachusetts | .25 | 8 | Indiana | 30.80 |
| 9 | Tennessee | 2,435 | 9 | Georgia | .25 | 9 | Kansas | 30.84 |
| 10 | Alabama | 2,147 | 10 | Texas | .25 | 10 | Iowa | 33.08 |
| 11 | Massachusetts | 2,115 | 11 | Maine | .28 | 11 | Pennsylvania | 34.09 |
| 12 | Virginia | 2,057 | 12 | Vermont | .29 | 12 | Ohio | 34.35 |
| 13 | Michigan | 1,981 | 13 | Missouri | .30 | 13 | Missouri | 34.44 |
| 14 | Georgia | 1,792 | 14 | Ohio | .34 | 14 | Virginia | 35.25 |
| 15 | Texas | 1,741 | 15 | Illinois | .36 | 15 | Vermont | 36.86 |
| 16 | Maine | 1,619 | 16 | Virginia | .45 | 16 | Maine | 37.40 |
| 17 | New Jersey | 1,467 | 17 | New York | .49 | 17 | New York | 39.37 |
| 18 | West Virginia | 1,399 | 18 | Michigan | .53 | 18 | Kentucky | 40.20 |
| 19 | Wisconsin | 1,222 | 19 | Kansas | .53 | 19 | Alabama | 41.66 |
| 20 | Minnesota | 1,211 | 20 | Tennessee | .54 | 20 | Maryland | 45.64 |
| 21 | Iowa | 1,206 | 21 | Pennsylvania | .61 | 21 | North Carolina | 54.80 |
| 22 | Kentucky | 1,076 | 22 | California | .67 | 22 | California | 72.90 |
| 23 | North Carolina | 1,049 | 23 | West Virginia | .92 | 23 | Massachusetts | 80.53 |
| 24 | Maryland | 1,024 | 24 | Iowa | 1.03 | 24 | Minnesota | 95.88 |
| 25 | Kansas | 1,019 | 25 | Maryland | 1.88 | 25 | Wisconsin | 138,58 |
| | United States total | 69,200 | | United States average | .46 | | United States average | 40.58 |

TABLE 2.—*Percentage by which each State's accident-frequency rate (deaths and injuries) per million man-hours of employment in quarrying and related industries decreased or increased in 1931 compared with 1930*

| State | Number of accidents per million man-hours in 1931 | Decrease or increase compared with 1930, percent | State | Number of accidents per million man-hours in 1931 | Decrease or increase compared with 1930, percent |
|---|---|---|---|---|---|
| Missouri | 34.74 | −46.0 | United States average | 41.04 | −3.4 |
| Tennessee | 26.31 | −25.9 | | | |
| Virginia | 35.70 | −22.0 | Texas | 28.23 | −3.2 |
| Massachusetts | 80.78 | −21.7 | Ohio | 34.69 | −2.8 |
| Illinois | 24.52 | −20.1 | West Virginia | 26.33 | .0 |
| Indiana | 30.97 | −19.0 | Kentucky | 40.20 | +1.0 |
| Vermont | 37.15 | −16.1 | Kansas | 31.37 | +3.1 |
| New Jersey | 29.86 | −12.1 | California | 73.57 | +4.3 |
| Maine | 37.68 | −12.0 | Michigan | 24.87 | +7.1 |
| Iowa | 34.11 | −11.7 | Alabama | 41.66 | +10.8 |
| New York | 39.86 | −8.9 | Georgia | 27.33 | +12.7 |
| Maryland | 47.52 | −6.5 | Minnesota | 95.88 | +38.1 |
| Pennsylvania | 34.70 | −5.0 | Wisconsin | 138.58 | +86.4 |

# ACKNOWLEDGMENTS

## SCOPE OF STATISTICS.

The tables in this paper have been compiled by the Bureau of Mines from reports received directly from operators of quarries (except for California, from which reports for quarries were received through the State Industrial Accident Commission), and they represent all stages of the quarrying industry. The total figures are based on returns representing 1,530 quarries which were worked all or part of the year. The figures also cover crushing and screening, rock dressing, and the manufacture of lime and cement so far as those operations are conducted by the quarry companies.

The Bureau of Mines is authorized to collect data on accidents at mines and quarries, but there is no Federal law that compels operators to supply such data; hence the reports received from operators are voluntary responses to the Bureau's requests for information. Although the figures presented herein may not be complete for the entire industry, every effort has been made to make them so, and the figures given are believed to be thoroughly representative of the hazards to which quarry workers are exposed. Moreover, the figures are comparable as between State and State, a fact extremely significant in view of the lack of uniformity among the States as regards classes of plants covered by State records, classes of accidents covered by State laws, and other factors that tend to make impracticable or impossible comparison of the accident experience of one State with that of another or comprehension of the relative importance of the various causes of accidents in the industry as a whole.

## QUARRIES CLASSIFIED

The quarries covered by this report have been classified, according to the kind of rock, as follows: Cement rock, granite, limestone, marble, sandstone and bluestone, slate, and trap rock. Separate statistical tables are presented for each group and for all groups combined. Clay pits, sand pits, and sand and gravel pits are not included.

## CLASSIFICATION OF INJURIES

From 1915 to 1929 the Bureau's statistics of accidents at quarries have divided all injuries into five main classes, as follows: (1) Fatalities, (2) permanent total disabilities, (3) permanent partial disabilities, (4) temporary disabilities lasting more than 14 days, and (5) temporary disabilities lasting more than the remainder of the shift on which the accident occurred but not exceeding 14 days. Beginning with 1930, classes (4) and (5) were consolidated under the general class of temporary injuries.

Figures covering accidents at quarries for the 5-year period 1927 to 1931 are given in table 29, page 46.

## DEFINITION OF ACCIDENT RATES

All accident rates shown in this publication, except where otherwise stated, have been calculated on the basis of million man-hours of exposure to occupational hazards.

TABLE 3.—All quarries: Number of active quarries, men employed, and man-shifts, by States, during the year ended Dec. 31, 1931

| State | Number of active quarries | Men employed | | | | | | | | Man-shifts | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | At quarry | | At outside works | | | | | Total | At quarry | | At outside works | | | | | Total |
| | | Open quarry | Underground quarry | Crusher | Lime-kiln | Cement mill | Rock-dressing plant | Miscellaneous | | Open quarry | Underground quarry | Crusher | Lime-kiln | Cement mill | Rock-dressing plant | Miscellaneous | |
| Alabama | 28 | 849 | 49 | 71 | 145 | 593 | 333 | 107 | 2,147 | 133,469 | 1,764 | 10,155 | 41,592 | 167,176 | 100,682 | 14,623 | 469,461 |
| Arizona | 5 | 40 | | 34 | 21 | | | 38 | 133 | 7,174 | | 2,768 | 6,414 | | | 10,070 | 26,426 |
| Arkansas | 10 | 217 | | 42 | 18 | | | | 277 | 31,569 | | 4,141 | 3,758 | | | | 39,468 |
| California | 122 | 1,162 | 199 | 694 | 53 | 927 | 247 | 146 | 3,428 | 228,404 | 53,031 | 80,895 | 14,558 | 297,421 | 58,925 | 38,102 | 771,336 |
| Colorado | 20 | 153 | 29 | 10 | 3 | 146 | 53 | | 394 | 26,593 | 6,739 | 1,353 | 900 | 43,518 | 13,990 | | 93,093 |
| Connecticut | 26 | 443 | | 59 | 10 | | 136 | 20 | 668 | 101,187 | | 11,965 | 3,500 | | 24,605 | 6,000 | 147,257 |
| Florida | 4 | 44 | | 11 | 30 | 100 | | | 185 | 8,300 | | 1,170 | 10,950 | 26,400 | | | 46,820 |
| Georgia | 24 | 789 | 13 | 72 | 20 | 181 | 674 | 43 | 1,792 | 175,933 | 1,300 | 15,401 | 3,280 | 62,765 | 186,411 | 9,494 | 454,584 |
| Idaho | 4 | 13 | | 2 | 5 | | | 35 | 67 | 2,808 | | 467 | 1,018 | 570 | 390 | 6,621 | 11,874 |
| Illinois | 41 | 1,611 | 114 | 349 | 128 | 894 | 6 | 60 | 3,162 | 357,639 | 31,697 | 68,091 | 38,226 | 244,272 | 1,440 | 9,956 | 751,321 |
| Indiana | 82 | 1,573 | | 129 | 139 | 650 | 1,407 | 29 | 3,927 | 265,906 | | 14,690 | 36,266 | 138,600 | 274,382 | 6,318 | 736,162 |
| Iowa | 24 | 367 | 12 | 108 | | 707 | 5 | 7 | 1,206 | 67,857 | 1,200 | 19,051 | | 195,116 | 1,030 | 840 | 285,094 |
| Kansas | 22 | 430 | 20 | 78 | | 467 | 2 | 22 | 1,019 | 74,558 | 1,000 | 12,966 | | 126,854 | 300 | 2,400 | 218,078 |
| Kentucky | 30 | 592 | 72 | 124 | 10 | 200 | 34 | 44 | 1,076 | 111,474 | 12,094 | 25,437 | 370 | 72,600 | 4,970 | 8,924 | 235,869 |
| Maine | 28 | 637 | 57 | 9 | 244 | | 524 | 36 | 1,619 | 150,291 | 11,708 | 3,261 | 89,060 | | 118,448 | 8,802 | 422,450 |
| Maryland | 32 | 506 | | 124 | 38 | 112 | 43 | 33 | 1,024 | 103,433 | | 22,987 | 76,836 | 40,880 | 6,476 | 7,919 | 228,781 |
| Massachusetts | 58 | 933 | 12 | 164 | 120 | 280 | 786 | 100 | 2,115 | 195,232 | 1,680 | 29,567 | 41,591 | 161,066 | 196,639 | 25,022 | 489,731 |
| Michigan | 21 | 846 | | 141 | | | 57 | 318 | 1,981 | 173,007 | | 23,778 | | 4,000 | 14,570 | 77,932 | 451,133 |
| Minnesota | 32 | 423 | | 54 | 5 | 614 | 705 | 9 | 1,211 | 80,190 | | 7,862 | 780 | 223,354 | 181,003 | 1,737 | 274,792 |
| Missouri | 53 | 1,469 | 214 | 190 | | 20 | 239 | 51 | 3,056 | 319,216 | 49,136 | 42,248 | | | 72,465 | 12,128 | 779,401 |
| Montana | 10 | 54 | | 4 | 182 | 711 | 7 | 1 | 75 | 8,461 | | 1,126 | 60,854 | 67,110 | 1,246 | 89 | 12,567 |
| Nebraska | 6 | 75 | 50 | 20 | 9 | | | 5 | 358 | 20,914 | 7,775 | 3,964 | 1,645 | | | 1,500 | 101,263 |
| New Hampshire | 15 | 177 | | 7 | | 208 | 324 | 62 | 570 | 36,136 | | 1,471 | | | 77,431 | 14,859 | 129,897 |
| New Jersey | 31 | 642 | 12 | 177 | 1 | 582 | | 65 | 1,467 | 123,715 | 2,160 | 29,914 | 143 | 165,638 | | 12,025 | 331,435 |
| New York | 94 | 2,091 | | 372 | 76 | 969 | 434 | 136 | 4,090 | 425,576 | | 60,540 | 14,631 | 296,104 | 92,035 | 31,046 | 922,092 |
| North Carolina | 15 | 578 | 123 | 167 | 10 | | 235 | 59 | 1,049 | 128,075 | 13,764 | 30,655 | 1,500 | | 60,976 | 14,560 | 235,766 |
| Ohio | 98 | 2,214 | | 417 | 587 | 781 | 491 | 231 | 4,844 | 411,229 | | 75,726 | 146,998 | 219,395 | 117,178 | 44,850 | 1,029,140 |
| Oklahoma | 14 | 340 | | 67 | | 199 | 16 | | 622 | 71,185 | | 12,885 | | 52,715 | 4,368 | 1,810 | 142,963 |
| Oregon | 15 | 91 | | 19 | 6 | 54 | 741 | 9 | 185 | 14,022 | | 4,600 | 180 | 14,747 | 1,314 | | 34,863 |
| Pennsylvania | 256 | 4,816 | 932 | 977 | 362 | 2,713 | 15 | 1,211 | 11,752 | 899,692 | 129,097 | 172,597 | 99,667 | 728,415 | 143,816 | 268,549 | 2,441,833 |
| Rhode Island | 8 | 62 | | 35 | 6 | | | 30 | 148 | 15,838 | | 6,950 | 1,344 | | 4,125 | 9,000 | 37,257 |
| South Carolina | 3 | 97 | | | | | | | 97 | 22,800 | | | | | | | 22,800 |
| South Dakota | 10 | 118 | | 17 | | 66 | 29 | 13 | 243 | 21,464 | | 2,646 | | 18,480 | 5,627 | 3,146 | 51,353 |
| Tennessee | 37 | 1,177 | 76 | 118 | 76 | 372 | 551 | 65 | 2,435 | 253,471 | 22,175 | 19,578 | 26,055 | 99,350 | 157,019 | 12,324 | 589,972 |
| Texas | 30 | 637 | | 161 | 128 | 678 | 54 | 83 | 1,741 | 114,759 | | 21,339 | 33,483 | 197,107 | 15,830 | 22,585 | 405,103 |
| Utah | 11 | 132 | 10 | 6 | 15 | 60 | | 41 | 264 | 17,984 | 150 | 1,818 | 3,980 | 5,400 | | 3,726 | 33,058 |

| | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vermont | 45 | 1,034 | 409 | 11 | 30 | ---- | 1,508 | 14 | 3,006 | 249,759 | 120,584 | 2,925 | 7,276 | ---- | 456,520 | 2,940 | 840,004 |
| Virginia | 44 | 1,199 | ---- | 179 | 142 | 263 | 58 | 216 | 2,057 | 257,902 | ---- | 36,425 | 38,177 | 90,079 | 9,215 | 46,289 | 478,087 |
| Washington | 31 | 290 | 6 | 44 | 24 | 252 | 18 | 28 | 662 | 53,126 | 725 | 9,486 | 6,316 | 66,498 | 3,431 | 8,271 | 147,853 |
| West Virginia | 22 | 840 | 146 | 84 | 72 | 127 | 1 | 129 | 1,399 | 131,110 | 34,816 | 18,562 | 20,617 | 28,982 | 275 | 23,985 | 258,347 |
| Wisconsin | 58 | 645 | ---- | 87 | 47 | 15 | 378 | 50 | 1,222 | 117,603 | ---- | 11,746 | 11,373 | 4,065 | 76,135 | 11,644 | 232,566 |
| Wyoming | 5 | 55 | ---- | ---- | ---- | ---- | ---- | ---- | 99 | 7,383 | ---- | ---- | ---- | ---- | ---- | ---- | 21,155 |
| Not segregated [1] | 6 | 161 | 44 | 56 | 23 | 82 | ---- | 6 | 328 | 45,629 | 13,772 | 15,925 | 6,480 | 26,158 | ---- | 1,806 | 95,998 |
| Total | 1,530 | 30,622 | 2,599 | 5,490 | 2,785 | 14,029 | 10,123 | 3,552 | 69,200 | 6,062,063 | 516,367 | 939,131 | 782,112 | 3,961,671 | 2,483,267 | 781,892 | 15,526,503 |

[1] Includes Delaware, Louisiana, Nevada, and New Mexico.

TABLE 4.—All quarries: Number of man-hours and average days active, by States, during the year ended Dec. 31, 1931

| State | Man-hours | | | | | | | | Average days active | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | At quarry | | | At outside works | | | | Total | At quarry | At outside works | Total |
| | Open quarry | Underground quarry | Crusher | Limekiln | Cement mill | Rock-dressing plant | Miscellaneous | | | | |
| Alabama | 1,232,574 | 17,640 | 92,313 | 325,434 | 1,541,588 | 974,960 | 136,396 | 4,320,905 | 151 | 268 | 219 |
| Arizona | 57,392 | | 22,144 | 51,312 | | | 80,560 | 211,408 | 179 | 207 | 199 |
| Arkansas | 295,381 | | 40,226 | 45,016 | | | | 380,623 | 145 | 132 | 142 |
| California | 1,810,076 | 425,568 | 614,241 | 128,898 | 2,414,204 | 279,650 | 308,377 | 5,981,014 | 207 | 237 | 225 |
| Colorado | 216,293 | 60,651 | 10,824 | 7,200 | 348,144 | 118,059 | | 761,171 | 183 | 282 | 236 |
| Connecticut | 869,314 | | 105,494 | 42,000 | | 196,840 | 54,000 | 1,267,648 | 228 | 205 | 220 |
| Florida | 83,000 | | 11,700 | 131,400 | 264,000 | | | 490,100 | 189 | 273 | 253 |
| Georgia | 1,590,823 | 13,000 | 150,036 | 32,800 | 561,920 | 1,593,786 | 82,460 | 4,024,825 | 221 | 280 | 254 |
| Idaho | 22,824 | | 3,916 | 8,718 | 2,280 | 1,560 | 52,908 | 92,266 | 216 | 168 | 177 |
| Illinois | 2,341,473 | 274,961 | 506,350 | 314,919 | 2,100,352 | 7,200 | 83,446 | 5,628,701 | 226 | 252 | 238 |
| Indiana | 2,232,462 | | 135,018 | 327,928 | 1,323,520 | 1,958,572 | 61,020 | 6,038,520 | 169 | 200 | 187 |
| Iowa | 613,016 | 12,000 | 175,894 | | 2,084,792 | 9,270 | 6,720 | 2,901,692 | 182 | 261 | 236 |
| Kansas | 641,266 | 9,500 | 112,479 | | 1,095,558 | 2,400 | 19,200 | 1,880,403 | 168 | 250 | 214 |
| Kentucky | 1,075,303 | 119,852 | 250,600 | 4,440 | 580,800 | 45,835 | 87,490 | 2,164,320 | 186 | 273 | 219 |
| Maine | 1,260,558 | 103,264 | 32,269 | 712,480 | 429,240 | 947,584 | 70,416 | 3,555,811 | 233 | 282 | 261 |
| Maryland | 962,452 | | 213,606 | 85,470 | 734,550 | 61,008 | 68,127 | 2,125,213 | 204 | 238 | 221 |
| Massachusetts | 1,637,035 | 13,620 | 264,979 | 342,948 | | 1,595,112 | 219,131 | 4,072,825 | 208 | 250 | 232 |
| Michigan | 1,425,838 | | 205,166 | 9,360 | 1,386,444 | 118,096 | 635,608 | 3,780,512 | 205 | 245 | 228 |
| Minnesota | 656,396 | | 67,678 | | 32,000 | 1,448,024 | 17,370 | 2,221,468 | 190 | 247 | 227 |
| Missouri | 2,719,433 | 462,810 | 369,791 | 517,003 | 1,923,182 | 661,005 | 112,810 | 6,766,034 | 219 | 299 | 255 |
| Montana | 67,688 | | 9,008 | 13,160 | | 9,968 | 712 | 100,536 | 157 | 196 | 168 |
| Nebraska | 191,838 | 67,000 | 35,061 | | 536,880 | | 15,000 | 845,779 | 230 | 311 | 283 |
| New Hampshire | 289,088 | | 11,768 | | | 619,448 | 118,872 | 1,039,176 | 204 | 239 | 228 |
| New Jersey | 1,077,862 | | 273,252 | 1,287 | 1,553,191 | | 109,224 | 3,014,316 | 193 | 252 | 226 |
| New York | 3,643,566 | 17,280 | 542,659 | 153,808 | 2,750,624 | 749,384 | 271,538 | 8,128,919 | 203 | 249 | 225 |
| North Carolina | 1,062,850 | | 269,735 | 15,000 | | 487,808 | 117,280 | 1,952,683 | 222 | 229 | 212 |
| Ohio | 3,532,174 | 122,948 | 649,709 | 1,305,934 | 1,811,076 | 1,037,154 | 391,797 | 8,850,792 | 182 | 241 | 230 |
| Oklahoma | 636,297 | | 139,994 | | 421,720 | 34,944 | | 1,232,955 | 209 | 255 | 188 |
| Oregon | 112,176 | | 22,320 | 1,800 | 117,976 | 10,512 | 14,480 | 279,264 | 154 | 222 | 208 |
| Pennsylvania | 7,921,776 | 1,056,508 | 1,463,255 | 902,928 | 6,380,912 | 1,218,675 | 2,351,147 | 21,295,201 | 179 | 235 | 252 |
| Rhode Island | 131,044 | | 56,950 | 10,752 | | 33,000 | 75,000 | 306,746 | 255 | 249 | 235 |
| South Carolina | 227,400 | | | | | | | 227,400 | 235 | | 235 |
| South Dakota | 185,656 | | 25,524 | | 147,840 | 45,016 | 25,168 | 429,204 | 182 | 239 | 211 |
| Tennessee | 2,387,840 | 180,050 | 174,616 | 213,915 | 869,794 | 1,570,190 | 114,092 | 5,510,497 | 220 | 266 | 242 |
| Texas | 1,108,537 | | 206,494 | 311,902 | 1,940,667 | 150,640 | 213,725 | 3,931,965 | 180 | 263 | 233 |
| Utah | 144,886 | 1,200 | 14,544 | 31,840 | 43,200 | | 32,850 | 288,520 | 128 | 122 | 125 |
| Vermont | 2,058,250 | 969,436 | 26,325 | 69,063 | | 3,687,050 | 26,460 | 6,836,584 | 257 | 300 | 279 |

| State | Underground quarry | | | | | | | | | | | | | | | | | Shaft or slope | | | | | | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27. Fall of rock from roof or wall | 28. Rock while loading at working face or chute | 29. Hand tools | 30. Explosives | 31. Haulage | 32. Falling down chute, winze, raise, or slope | 33. Run of rock from chute or pocket | 34. Drilling | 35. Electricity | 36. Machinery (other than locomotives or drills) | 37. Mines fires | 38. Suffocation from natural gases | 39. Inrush of water | 40. Stepping on nails, etc. | 41. Handling materials (other than rock) | 42. Other causes | Total | 43. Falling down shaft or slope | 44. Objects falling down shaft or slope | 45. Breaking of cables | 46. Overwinding | 47. Cage, skip, or bucket | 48. Other causes | Total | |
| Arkansas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| California | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Connecticut | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Georgia | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Illinois | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Indiana | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Iowa | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Kansas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Maine | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Maryland | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Massachusetts | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Michigan | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Missouri | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| New York | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Ohio | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Oregon | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Pennsylvania | | | | 1 | | | | | | 2 | | | | | | | 3 | | | | | | | 0 | 13 |
| South Dakota | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Tennessee | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | 0 | 3 |
| Texas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Utah | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Vermont | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Virginia | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| West Virginia | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | 0 | 1 |
| Wyoming | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Not segregated | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Total | 2 | | | 1 | | | | | | 2 | | | | | | | 5 | | | | | | | 0 | 61 |

TABLE 5.—*All quarries: Fatalities and injuries and rates per million man-hours by States, during the year ended Dec. 31, 1931*

| State | Number killed | | | | | Number injured | | | | | Widows | Orphans | Rates per million man-hours | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | | | Killed | | | Injured | | |
| | Open quarry | Outside works | Underground quarry | Shaft or slope | Total | Open quarry | Outside works | Underground quarry | Shaft or slope | Total | | | At quarry | At outside works | Total | At quarry | At outside works | Total |
| Alabama | --- | --- | --- | --- | --- | 115 | 62 | 1 | 2 | 180 | --- | --- | --- | --- | --- | 94.38 | 20.19 | 41.66 |
| Arizona | --- | --- | --- | --- | --- | 7 | 6 | --- | --- | 13 | --- | --- | --- | --- | --- | 121.97 | 38.96 | 61.49 |
| Arkansas | 1 | --- | --- | --- | 1 | 16 | 1 | --- | --- | 17 | 1 | --- | 3.39 | --- | 2.63 | 54.17 | 11.73 | 44.66 |
| California | 4 | --- | --- | --- | 4 | 189 | 126 | 121 | --- | 436 | --- | --- | 1.79 | --- | .67 | 138.66 | 33.64 | 72.90 |
| Colorado | --- | --- | --- | --- | --- | 15 | 15 | 6 | --- | 36 | --- | --- | --- | --- | --- | 75.83 | 30.98 | 47.30 |
| Connecticut | --- | 1 | --- | --- | 1 | 41 | 22 | --- | --- | 63 | 1 | 4 | --- | 2.51 | .79 | 47.16 | 55.23 | 49.70 |
| Florida | --- | --- | --- | --- | --- | 4 | --- | --- | --- | 4 | --- | --- | --- | --- | --- | 48.19 | --- | 8.16 |
| Georgia | 1 | --- | --- | --- | 1 | 62 | 47 | --- | --- | 109 | 1 | --- | --- | .62 | .25 | 38.66 | 19.41 | 27.08 |
| Idaho | --- | --- | --- | --- | --- | 1 | 5 | --- | --- | 6 | --- | --- | --- | --- | --- | 43.81 | 72.00 | 65.03 |
| Illinois | 2 | --- | --- | --- | 2 | 76 | 48 | 11 | 1 | 136 | 1 | 5 | --- | .76 | .36 | 33.63 | 15.93 | 24.16 |
| Indiana | 1 | --- | --- | --- | 1 | 105 | 81 | --- | --- | 186 | 1 | --- | --- | .45 | .17 | 47.03 | 21.28 | 30.80 |
| Iowa | 3 | --- | --- | --- | 3 | 69 | 27 | --- | --- | 96 | 2 | 6 | --- | 4.80 | 1.03 | 110.40 | 11.86 | 33.08 |
| Kansas | 1 | --- | --- | --- | 1 | 44 | 14 | --- | --- | 58 | --- | --- | --- | 1.54 | .53 | 67.61 | 11.39 | 30.84 |
| Kentucky | --- | --- | --- | --- | --- | 60 | 25 | 2 | --- | 87 | --- | --- | --- | --- | --- | 51.88 | 25.80 | 40.20 |
| Maine | 1 | --- | --- | --- | 1 | 86 | 39 | 8 | --- | 133 | --- | --- | --- | .73 | .28 | 68.92 | 17.79 | 37.40 |
| Maryland | 2 | 2 | --- | --- | 4 | 71 | 26 | --- | --- | 97 | 2 | 4 | 2.08 | 1.72 | 1.88 | 73.77 | 22.36 | 45.64 |
| Massachusetts | 1 | --- | --- | --- | 1 | 206 | 121 | 1 | --- | 328 | 1 | --- | --- | .61 | .25 | 125.40 | 49.96 | 80.53 |
| Michigan | 2 | --- | --- | --- | 2 | 49 | 43 | --- | --- | 92 | 2 | 3 | 1.40 | --- | .53 | 34.37 | 18.26 | 24.34 |
| Minnesota | --- | --- | --- | --- | --- | 99 | 114 | --- | --- | 213 | --- | --- | --- | --- | --- | 150.82 | 72.84 | 95.88 |
| Missouri | 2 | --- | --- | --- | 2 | 127 | 82 | 23 | 1 | 233 | 1 | 1 | --- | .63 | .30 | 47.45 | 22.88 | 34.44 |
| Montana | --- | --- | --- | --- | --- | 7 | --- | --- | --- | 7 | --- | --- | --- | --- | --- | 103.42 | --- | 69.63 |
| Nebraska | --- | --- | --- | --- | --- | 3 | 4 | --- | --- | 7 | --- | --- | --- | --- | --- | 11.59 | 6.81 | 8.28 |
| New Hampshire | --- | --- | --- | --- | --- | 15 | 39 | --- | --- | 54 | --- | --- | --- | --- | --- | 51.89 | 51.99 | 51.96 |
| New Jersey | --- | --- | --- | --- | --- | 54 | 36 | --- | --- | 90 | --- | --- | --- | --- | --- | 50.12 | 18.59 | 29.86 |
| New York | 3 | 1 | --- | --- | 4 | 211 | 107 | 2 | --- | 320 | 3 | 2 | .82 | .22 | .49 | 58.18 | 23.95 | 39.37 |
| North Carolina | --- | --- | --- | --- | --- | 56 | 51 | --- | --- | 107 | --- | --- | --- | --- | --- | 52.69 | 57.31 | 54.80 |
| Ohio | 2 | 1 | --- | --- | 3 | 156 | 143 | 5 | --- | 304 | 2 | 1 | .55 | .19 | .34 | 44.05 | 27.52 | 34.35 |
| Oklahoma | --- | --- | --- | --- | --- | 29 | 19 | --- | --- | 48 | --- | --- | --- | --- | --- | 45.58 | 31.84 | 38.93 |
| Oregon | --- | --- | --- | 1 | 1 | 4 | 9 | --- | --- | 13 | --- | --- | 5.98 | --- | 3.58 | 35.66 | 53.86 | 46.55 |
| Pennsylvania | 8 | 2 | 3 | --- | 13 | 462 | 239 | 25 | --- | 726 | 8 | 30 | 1.23 | .16 | .61 | 54.24 | 19.40 | 34.09 |
| Rhode Island | --- | --- | --- | --- | --- | 3 | 8 | --- | --- | 11 | --- | --- | --- | --- | --- | 22.89 | 45.53 | 35.86 |
| South Carolina | --- | --- | --- | --- | --- | 45 | --- | --- | --- | 45 | --- | --- | --- | --- | --- | 197.89 | --- | 197.89 |
| South Dakota | --- | 1 | --- | --- | 1 | 43 | 14 | --- | --- | 57 | 1 | --- | --- | 4.11 | 2.33 | 231.61 | 57.48 | 132.80 |
| Tennessee | 2 | --- | 1 | --- | 3 | 80 | 60 | 2 | --- | 142 | 1 | 3 | 1.17 | --- | .54 | 31.93 | 20.39 | 25.77 |
| Texas | --- | 1 | --- | --- | 1 | 48 | 62 | --- | --- | 110 | 1 | --- | --- | .35 | .25 | 43.30 | 21.96 | 27.98 |
| Utah | 1 | --- | --- | --- | 1 | 11 | 3 | --- | --- | 14 | 1 | 4 | 6.85 | --- | 3.72 | 75.30 | 24.50 | 52.14 |
| Vermont | 2 | --- | --- | --- | 2 | 94 | 117 | 41 | --- | 252 | 1 | 1 | .66 | --- | .29 | 44.59 | 30.72 | 36.86 |
| Virginia | 1 | 1 | --- | --- | 2 | 104 | 53 | --- | --- | 157 | 1 | 2 | .41 | .49 | .45 | 42.90 | 26.10 | 35.25 |
| Washington | --- | --- | --- | --- | --- | 42 | 14 | --- | --- | 56 | --- | --- | --- | --- | --- | 97.49 | 18.32 | 46.86 |
| West Virginia | 1 | --- | 1 | --- | 2 | 38 | 16 | 1 | --- | 55 | 2 | 5 | 1.43 | --- | .92 | 27.96 | 20.78 | 25.41 |
| Wisconsin | --- | --- | --- | --- | --- | 149 | 124 | --- | --- | 273 | --- | --- | --- | --- | --- | 151.07 | 126.07 | 138.58 |
| Wyoming | 1 | --- | --- | --- | 1 | 6 | --- | 6 | --- | 12 | 1 | 1 | 5.87 | --- | 5.87 | 70.41 | --- | 70.41 |
| Not segragated | 3 | --- | --- | --- | 3 | 29 | 15 | --- | --- | 44 | 1 | 4 | 7.05 | --- | 3.41 | 68.17 | 33.04 | 50.04 |
| Total | 45 | 11 | 5 | --- | 61 | 3,131 | 2,037 | 255 | 4 | 5,427 | 36 | 76 | .89 | .14 | .46 | 60.23 | 26.29 | 40.58 |

## ACCIDENTS BY PRINCIPAL CAUSES

More accidental injuries inside the quarries were due to handling materials than to any other single cause. Flying objects ranked second and falls or slides of rock or overburden third. In underground quarries the largest number of accidents were those connected with loading rock at the face or chute. Handling materials was the principal hazard at operations outside the quarries. Tables 6 and 7 show the number of deaths and injuries from various causes.

A classification of the 5,488 injuries reported by all operating companies in 1931 showed that 61 accidents resulted in death, 16 caused permanent total disability, 189 caused permanent partial disability, and 5,222 resulted in temporary disability for more than the remainder of the day on which the accident occurred. For each fatality reported

there were 89 nonfatal injuries.    Reports for men employed inside the pits at open quarries showed 70 nonfatal injuries to each fatality; reports for men employed underground and in shafts at underground quarries showed 51 injuries per fatality; while reports for surface shops, mills, and yards showed 185 nonfatal injuries to each fatal accident.    These ratios of injuries to fatalities should be considered in connection with the accident-frequency rates for each of the four groups mentioned.    Fatal and nonfatal accidents to "inside" employees at open quarries revealed a frequency rate of 61.15 per million man-hours of exposure; the corresponding rate for underground workers at underground quarries was 60.83 and that for surface, mill, and shop employees at all plants 26.44, the combined rate for all three groups being 41.03 as previously stated.

TABLE 6.—All quarries: Fatalities, by causes and States, during the year ended Dec. 31, 1931 [1]

| State | Open quarry | | | | | | | | | | | | | | | | At outside works | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. Falls or slides of rock or overburden | 2. Handling materials | 3. Hand tools | 4. Explosives | 5. Haulage | 6. Falls of persons | 7. Falling objects (other than 1 and 2) | 8. Flying objects | 9. Electricity | 10. Drilling and channeling (by machine or hand) | 11. Machinery | 12. Stepping on nails, etc. | 13. Boiler and air-tank explosions | 14. Burns | 15. Other causes | Total | 16. Haulage | 17. Machinery | 18. Hand tools | 19. Stepping on nails, etc. | 20. Electricity | 21. Falls of persons | 22. Falling objects (rocks, timbers, etc.) | 23. Flying objects | 24. Handling materials | 25. Burns | 26. Other causes | Total |
| Arkansas | | | | | 1 | | | | | | | | | | | 1 | | | | | | | | | | | | 0 |
| California | 3 | | | | | | | | | | 1 | | | | | 4 | | 1 | | | | | | | | | | 1 |
| Connecticut | 1 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Georgia | | | | | | | | 1 | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Illinois | | | | 1 | | | | | | | | | | 1 | | 2 | | | | | | | | | | 1 | | 1 |
| Indiana | | | | | | | | | 1 | | | | | | | 1 | | | | | | | | | | | | 0 |
| Iowa | | | | 1 | | | | | | | 1 | | | | | 2 | 1 | | | | | | | | | | | 1 |
| Kansas | | | | | | | 1 | | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Maine | | | | | | 1 | | | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Maryland | 2 | | | | | | | | | | | | | | | 2 | | | | | | | | | | | | 0 |
| Massachusetts | | | | | | | | | | | 1 | | | | | 1 | | | | | | | | | | | | 0 |
| Michigan | | 1 | | | 1 | | | | | | | | | | | 2 | | | | | | | | | | | | 0 |
| Missouri | | | | | 1 | | | | 1 | | | | | | | 2 | | | | | | | | | | | | 0 |
| New York | | | | | 1 | | | | | | 1 | | | | | 2 | | | | | | 1 | | | | | | 1 |
| Ohio | | | | | | | | | | | 1 | | | | 1 | 2 | 1 | | | | | | | | | | | 1 |
| Oregon | | | | | | | | | | | | | | | | 0 | | | | | | | | | | | | 0 |
| Pennsylvania | 1 | | | | | 6 | | | | | 1 | | | | | 8 | | | | | 1 | | 1 | | | 1 | 1 | 4 |
| South Dakota | | | | 2 | | | | | | | | | | | | 2 | | | | | | | | | | | | 0 |
| Tennessee | | | | | | | | | | | | | | | | 0 | | | | | | | | | | | | 0 |
| Texas | 1 | | | | | | | | | | | | | | | 1 | | | | | | 1 | | | | | | 1 |
| Utah | 1 | | | | 1 | | | | | | | | | | | 2 | | | | | | | | | | | | 0 |
| Vermont | | | | | | | | 1 | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Virginia | 1 | | | | | | | | | | | | | | | 1 | | | | | | | 1 | | | | | 1 |
| West Virginia | 1 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | 0 |
| Wyoming | | | | | | 2 | | | | | 1 | | | | | 3 | | | | | | | | | | | | 0 |
| Not segregated | | | | | | | | | | | | | | | 1 | 1 | | | | | | | | | | | | 0 |
| Total | 11 | 1 | | 4 | 5 | 9 | 1 | 2 | 2 | | 7 | | | 1 | 2 | 45 | 2 | 1 | | | 1 | 2 | 2 | | | 2 | 1 | 11 |

[1] No fatalities occurred in Alabama, Arizona, Colorado, Florida, Idaho, Kentucky, Minnesota, Montana, Nebraska, New Hampshire, New Jersey, North Carolina, Oklahoma, Rhode Island, South Carolina, Washington, and Wisconsin.

| State | Underground quarry | | | | | | | | | | | | | | | | | Shaft or slope | | | | | | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fall of rock from roof or wall (27) | Rock while loading at working face or chute (28) | Hand tools (29) | Explosives (30) | Haulage (31) | Falling down chute, winze, raise, or slope (32) | Run of rock from chute or pocket (33) | Drilling (34) | Electricity (35) | Machinery (other than locomotives or drills) (36) | Mines fires (37) | Suffocation from natural gases (38) | Inrush of water (39) | Stepping on nails, etc. (40) | Handling materials (other than rock) (41) | Other causes (42) | Total | Falling down shaft or slope (43) | Objects falling down shaft or slope (44) | Breaking of cables (45) | Overwinding (46) | Cage, skip, or bucket (47) | Other causes (48) | Total | |
| Arkansas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| California | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Connecticut | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Georgia | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Illinois | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Indiana | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Iowa | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Kansas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Maine | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Maryland | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Massachusetts | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Michigan | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Missouri | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| New York | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 4 |
| Ohio | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Oregon | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Pennsylvania | | | | 1 | | | | | | 2 | | | | | | | 3 | | | | | | | 0 | 13 |
| South Dakota | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Tennessee | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | 0 | 3 |
| Texas | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Utah | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 1 |
| Vermont | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Virginia | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| West Virginia | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | 0 | 1 |
| Wyoming | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 2 |
| Not segregated | | | | | | | | | | | | | | | | | 0 | | | | | | | 0 | 3 |
| Total | 2 | | | 1 | | | | | | 2 | | | | | | | 5 | | | | | | | 0 | 61 |

TABLE 7.—All quarries: Injuries, by causes and States, during the year ended Dec. 31, 1931

| State | Open quarry | | | | | | | | | | | | | | | | At outside works | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Falls or slides of rock or overburden (1) | Handling materials (2) | Hand tools (3) | Explosives (4) | Haulage (5) | Falls of persons (6) | Falling objects (other than 1 and 2) (7) | Flying objects (8) | Electricity (9) | Drilling and channeling (by machine or hand) (10) | Machinery (11) | Stepping on nails, etc. (12) | Boiler and air-tank explosions (13) | Burns (14) | Other causes (15) | Total | Haulage (16) | Machinery (17) | Hand tools (18) | Stepping on nails, etc. (19) | Electricity (20) | Falls of persons (21) | Falling objects (rocks, timbers, etc.) (22) | Flying objects (23) | Handling materials (24) | Burns (25) | Other causes (28) | Total |
| Alabama | 5 | 24 | 3 | | 5 | 15 | 7 | 15 | 1 | 7 | 10 | 2 | | 4 | 17 | 115 | 3 | 12 | 1 | | 2 | 3 | 16 | 3 | 11 | 6 | 5 | 62 |
| Arizona | 1 | 10 | | | | 1 | 4 | | | | | | | | 2 | 7 | 2 | | | | | 1 | | | 1 | | 2 | 6 |
| Arkansas | | | 9 | 5 | 1 | | | 4 | | | | | | | | 16 | | | | | | | | | | | | 1 |
| California | 27 | 46 | | | 16 | 27 | 6 | 15 | 1 | 18 | 13 | 2 | | 1 | 3 | 189 | 6 | 22 | 10 | 2 | 6 | 17 | 15 | 15 | 21 | 7 | 5 | 126 |
| Colorado | 2 | 7 | 2 | | | 8 | 1 | 4 | | | 7 | | | | | 15 | | 3 | | | | 4 | | 4 | 4 | 1 | 2 | 15 |
| Connecticut | 3 | 12 | | | 2 | 1 | 2 | 2 | | 1 | 1 | 1 | | | | 41 | 1 | 1 | | | | 1 | 4 | 6 | 6 | 1 | 2 | 20 |
| Florida | | 1 | 7 | | | | 1 | 5 | | | 7 | | | | 7 | 4 | | | | | | | | | | | | 0 |
| Georgia | 4 | 15 | | 1 | 8 | 7 | 2 | | 1 | 5 | 1 | 1 | | 2 | | 62 | 1 | 3 | 3 | 2 | 1 | 6 | 3 | 11 | 12 | 2 | 7 | 47 |
| Idaho | | | | | 5 | | | 16 | | | 3 | | | | | 1 | | 1 | 1 | 2 | | 3 | | | | | 1 | 5 |
| Illinois | 9 | 18 | 5 | 5 | 6 | 9 | | | | 3 | | | | 5 | 14 | 76 | 9 | 5 | 3 | | 1 | 2 | 4 | 4 | 6 | 6 | 6 | 48 |
| Indiana | 12 | 20 | 3 | 1 | 2 | 3 | 1 | 6 | | 5 | 6 | 2 | | 2 | 16 | 105 | 4 | 14 | 9 | | | 4 | 23 | 3 | 21 | 2 | 6 | 81 |
| Iowa | 4 | 36 | 1 | 3 | | | 5 | 6 | | 1 | 6 | 1 | | 1 | 3 | 69 | 1 | 4 | 2 | 1 | | 3 | 4 | 3 | 3 | 3 | 7 | 27 |
| Kansas | 13 | 21 | 1 | 6 | 10 | | 1 | 15 | | | 6 | 1 | | | | 44 | | 7 | 4 | | | 1 | | 1 | 1 | | 2 | 14 |
| Kentucky | 12 | 18 | 2 | | 4 | 1 | | 5 | | 4 | 2 | | | | 2 | 60 | 3 | 2 | 3 | | | 1 | | | | 1 | 3 | 25 |
| Maine | 7 | 9 | 1 | | 5 | 3 | | 7 | | 18 | 11 | | | | 5 | 86 | 3 | 8 | 6 | 1 | 1 | 4 | 3 | 8 | 10 | 2 | 1 | 39 |
| Maryland | 18 | 37 | 2 | | 13 | | | 18 | | 3 | 11 | | 1 | | 7 | 71 | 2 | 10 | 5 | 2 | | 7 | 3 | 4 | 4 | 14 | | 26 |
| Massachusetts | 10 | 70 | 20 | 3 | 7 | 17 | 1 | 5 | | 15 | 3 | 1 | | | 17 | 206 | 9 | 6 | | 2 | | 6 | | 10 | 44 | 1 | 13 | 121 |
| Michigan | 5 | 12 | 1 | | 5 | | 4 | 25 | 2 | 6 | 6 | 1 | | 1 | 2 | 49 | 2 | 3 | 5 | | | 6 | 8 | 4 | 17 | 3 | | 43 |
| Minnesota | 4 | 37 | 5 | 3 | 6 | 7 | 4 | 2 | | 6 | 2 | 2 | | | 6 | 99 | | 17 | 3 | | 1 | 5 | 4 | 57 | 17 | 9 | 17 | 114 |
| Missouri | 15 | 42 | 1 | 6 | 18 | 5 | 3 | 15 | | 8 | 11 | | 1 | 1 | 4 | 127 | 6 | | 10 | | | | 3 | 13 | 13 | | 5 | 82 |
| Montana | 1 | 2 | | | | 5 | 1 | 13 | | | 8 | | | | | 3 | | | | | | | 7 | | | | | 0 |
| Nebraska | 1 | | | | 2 | | 3 | 2 | | | 1 | | | | | 9 | | 2 | | | | 1 | | | | | | 4 |
| New Hampshire | 3 | 5 | 2 | 1 | | 1 | | | | 3 | | 1 | | 2 | 4 | 54 | 1 | 2 | 5 | 1 | 1 | 2 | 3 | 9 | 4 | 2 | 15 | 39 |
| New Jersey | 7 | 14 | 3 | 3 | 25 | 6 | 1 | 4 | 1 | 14 | 1 | | | | 31 | 12 | 15 | 3 | 1 | 2 | 9 | 1 | 5 | 6 | 8 | 1 | 36 |
| New York | 25 | 58 | 19 | 1 | 1 | 10 | 3 | 8 | | | 5 | 2 | | 4 | 3 | 56 | 2 | 13 | 5 | 2 | 1 | 18 | 9 | 19 | 15 | | 26 | 107 |
| North Carolina | 12 | 8 | | 1 | 20 | 4 | 6 | 11 | | 16 | 25 | 1 | | 2 | 9 | 156 | 9 | 8 | 10 | | 2 | 1 | 6 | 20 | 13 | 2 | 24 | 51 |
| Ohio | 11 | 23 | 4 | 1 | 6 | 20 | | 8 | 2 | | 5 | | 1 | | 2 | 59 | | 22 | | 1 | | 1 | 18 | 16 | 13 | 1 | 5 | 143 |
| Oklahoma | 2 | 7 | 4 | | 20 | | 10 | 15 | | 13 | 18 | | | | | 4 | | 1 | | | | | 5 | 2 | 1 | | 1 | 19 |
| Oregon | 1 | 1 | | | 2 | | 1 | 8 | | 1 | | | | | | 14 | | 2 | | | | | 1 | 1 | 1 | | | 9 |
| Pennsylvania | 44 | 187 | 16 | 4 | 22 | 23 | 21 | 72 | 1 | 13 | 14 | 3 | 1 | 8 | 33 | 462 | 25 | 36 | 15 | | 10 | 20 | 21 | 18 | 44 | 19 | 31 | 229 |

| | Total |
|---|---|
| Rhode Island | 8 |
| South Carolina | 0 |
| South Dakota | 14 |
| Tennessee | 60 |
| Texas | 62 |
| Utah | 3 |
| Vermont | 117 |
| Virginia | 53 |
| Washington | 14 |
| West Virginia | 16 |
| Wisconsin | 124 |
| Wyoming | 0 |
| Not segregated | 15 |
| Total | 2,037 |

Column totals (Total row): 301 | 930 | 137 | 65 | 241 | 217 | 101 | 416 | 17 | 201 | 205 | 32 | 3 | 39 | 226 | 3,131 | 135 | 292 | 118 | 19 | 35 | 171 | 204 | 333 | 376 | 119 | 235 | 2,037

TABLE 7.—All quarries: Injuries, by causes and States, during the year ended Dec. 31, 1931—Continued

| State | Underground quarry | | | | | | | | | | | | | | | | | Shaft or slope | | | | | | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fall of rock from roof or wall (27) | Rock while loading at working face or chute (28) | Hand tools (29) | Explosives (30) | Haulage (31) | Falling down chute, winze, raise, or slope (32) | Run of rock from chute or pocket (33) | Drilling (34) | Electricity (35) | Machinery (other than locomotives or drills) (36) | Mine fires (37) | Suffocation from natural gases (38) | Inrush of water (39) | Stepping on nails, etc. (40) | Handling materials (other than rock) (41) | Other causes (42) | Total | Falling down shaft or slope (43) | Objects falling down shaft or slope (44) | Breaking of cables (45) | Overwinding (46) | Cage, skip, or bucket (47) | Other causes (48) | Total | |
| Alabama | | | | | | | | | | | | | | | | 1 | 1 | | | | | 2 | | 2 | 180 |
| Arizona | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| Arkansas | | | | | | | | | | | | | | | | | | | | | | | | | 17 |
| California | 21 | 19 | 8 | 4 | 8 | 8 | 26 | 16 | | 2 | | | | | 2 | 5 | 121 | | | | | | | | 436 |
| Colorado | | | | | | | | | 1 | | | | | 1 | | 5 | 6 | | | | | | | | 36 |
| Connecticut | | | | | | | | | | | | | | | | | | | | | | | | | 63 |
| Florida | | | | | | | | | | | | | | 1 | | | | | | | | | | | 4 |
| Georgia | | | | | | | | | | | | | | | | | | | | | | | | | 109 |
| Idaho | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| Illinois | | | | | | | | | | | | | | | | | 1 | | | | | | | | 136 |
| Indiana | | | | | | | | | | | | | | | | | | | 1 | | | | | 1 | 186 |
| Iowa | 2 | | | | 2 | | | | | | | | | | | | | | | | | | | | 96 |
| Kansas | | | | | 1 | 1 | | | 1 | 1 | | | | 1 | 2 | 1 | | | | | | | | | 58 |
| Kentucky | 1 | | | | | | | | | | | | | | | | | | | | | | | | 87 |
| Maine | 3 | | | | 1 | 1 | | | | | | | | | | | 2 | | | | | | | | 133 |
| Maryland | | 3 | | | | | | | | | | | | | | | 8 | | | | | | | | 97 |
| Massachusetts | 1 | | | | | | | | | | | | | | | | | | | | | | | | 328 |
| Michigan | | | | | | | | | | | | | | | | | | | | | | | | | 92 |
| Minnesota | 3 | 9 | | | 1 | 2 | | 2 | | | | | | 1 | 1 | | 23 | | | | | | | | 213 |
| Missouri | | | | | | | | | | | | | | | | 4 | | | 1 | | | | | | 233 |
| Montana | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| Nebraska | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| New Hampshire | | | | | | | | | | | | | | | | | | | | | | | | | 54 |
| New Jersey | | | | | | | | | | | | | | | | | | | | | | | | | 90 |

| State | | | | | | | | | | | | | | | | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| New York | | | | | | | | | | | | | 1 | 1 | 2 | | | | | | | 0 | 320 |
| North Carolina | | | | | | | | | | | | | | | | 0 | | | | | | 0 | 107 |
| Ohio | 2 | | | | | | | | | | | | 3 | | | 5 | | | | | | 0 | 304 |
| Oklahoma | | | | | | | | | | | | | | | | 0 | | | | | | 0 | 48 |
| Oregon | | | | | | | | | | | | | 3 | | | 0 | | | | | | 0 | 13 |
| Pennsylvania | 4 | 10 | | 1 | 3 | 1 | | 3 | | | | | 3 | | | 25 | | | | | | 0 | 726 |
| Rhode Island | | | | | | | | | | | | | | | | 0 | | | | | | 0 | 11 |
| South Carolina | | | | | | | | | | | | | | | | 0 | | | | | | 0 | 45 |
| South Dakota | | 1 | | | | | | | | | | | | | | 0 | | | | | | 0 | 57 |
| Tennessee | | | | | | | | 1 | | | | | | | 1 | 2 | | | | | | 0 | 142 |
| Texas | | | 5 | | | | | | | | | | | | | 0 | | | | | | 0 | 110 |
| Utah | 1 | | | | | | | 6 | 1 | 3 | | 2 | | 11 | | 0 | | | | | | 0 | 14 |
| Vermont | | 3 | | 1 | 2 | | | 6 | 1 | | | | 6 | | | 41 | | | | | | 0 | 252 |
| Virginia | | | 1 | | | | | | | | | | | | | 0 | | | | | | 0 | 157 |
| Washington | 1 | | | | | | | | | | | | | | | 0 | | | | | | 0 | 56 |
| West Virginia | | | | | | | | | | | | | | 2 | | 1 | | | | | | 0 | 55 |
| Wisconsin | | 3 | | | | | | | | | | | | | | 0 | | | | | | 0 | 273 |
| Wyoming | | | 1 | | | | | | | | | | | | | 6 | | | | | | 0 | 12 |
| Not segregated | | | | | | | | | | | | | | | | 0 | | | | | | 0 | 44 |
| Total | 39 | 48 | 14 | 6 | 17 | 13 | 26 | 28 | 3 | 6 | | 6 | 18 | 31 | 255 | | 2 | | 2 | | 4 | 5,427 |

TABLE 8.—*All quarries: Accidents by States and severity of injury, during the year ended Dec. 31, 1931*

| State | Killed | Nonfatal | | | | Grand total |
|-------|--------|----------------------|----------------------|----------|-------------------|-------------|
| | | Permanent total[1] | Permanent partial[2] | Temporary[3] | Total nonfatal | |
| Alabama | | | 10 | 170 | 180 | 180 |
| Arizona | | | | 13 | 13 | 13 |
| Arkansas | 1 | | | 17 | 17 | 18 |
| California | 4 | | 5 | 431 | 436 | 440 |
| Colorado | | | | 36 | 36 | 36 |
| Connecticut | 1 | | 5 | 58 | 63 | 64 |
| Florida | | | | 4 | 4 | 4 |
| Georgia | 1 | | 6 | 103 | 109 | 110 |
| Idaho | | | | 6 | 6 | 6 |
| Illinois | 2 | | 5 | 131 | 136 | 138 |
| Indiana | 1 | | 9 | 177 | 186 | 187 |
| Iowa | 3 | 1 | 3 | 92 | 96 | 99 |
| Kansas | 1 | 2 | 5 | 51 | 58 | 59 |
| Kentucky | | | 4 | 83 | 87 | 87 |
| Maine | 1 | | 4 | 129 | 133 | 134 |
| Maryland | 4 | | 1 | 96 | 97 | 101 |
| Massachusetts | 1 | | 4 | 324 | 328 | 329 |
| Michigan | 2 | 1 | 3 | 88 | 92 | 94 |
| Minnesota | | | 2 | 211 | 213 | 213 |
| Missouri | 2 | | 6 | 227 | 233 | 235 |
| Montana | | | | 7 | 7 | 7 |
| Nebraska | | | 1 | 6 | 7 | 7 |
| New Hampshire | | | | 54 | 54 | 54 |
| New Jersey | | | 3 | 87 | 90 | 90 |
| New York | 4 | | 21 | 299 | 320 | 324 |
| North Carolina | | | 3 | 104 | 107 | 107 |
| Ohio | 3 | 1 | 11 | 292 | 304 | 307 |
| Oklahoma | | 7 | 15 | 26 | 48 | 48 |
| Oregon | 1 | | | 13 | 13 | 14 |
| Pennsylvania | 13 | | 15 | 711 | 726 | 739 |
| Rhode Island | | 1 | | 10 | 11 | 11 |
| South Carolina | | | | 45 | 45 | 45 |
| South Dakota | 1 | | 1 | 56 | 57 | 58 |
| Tennessee | 3 | | 6 | 136 | 142 | 145 |
| Texas | 1 | | 9 | 101 | 110 | 111 |
| Utah | 1 | | 1 | 13 | 14 | 15 |
| Vermont | 2 | | 9 | 243 | 252 | 254 |
| Virginia | 2 | | 8 | 149 | 157 | 159 |
| Washington | | 1 | 2 | 53 | 56 | 56 |
| West Virginia | 2 | | 4 | 51 | 55 | 57 |
| Wisconsin | | | 4 | 269 | 273 | 273 |
| Wyoming | 1 | 1 | | 11 | 12 | 13 |
| Not segregated | 3 | 1 | 4 | 39 | 44 | 47 |
| Total | 61 | 16 | 189 | 5,222 | 5,427 | 5,488 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of 1 foot, leg, hand, or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Disability for more than remainder of day of accident.

TABLE 9.—*All quarries: Accidents by causes and severity of injury, during the year ended Dec. 31, 1931*

| Cause | Killed | Nonfatal | | | | Grand total |
|---|---|---|---|---|---|---|
| | | Permanent total [1] | Permanent partial [2] | Temporary [3] | Total nonfatal | |
| 1. Falls or slides of rock or overburden | 11 | 1 | 4 | 296 | 301 | 312 |
| 2. Handling materials: | | | | | | |
|   (a) Handling rock at face | 1 | 1 | 9 | 775 | 785 | 786 |
|   (b) Handling other material | | 2 | 3 | 140 | 145 | 145 |
| 3. Hand tools | | 2 | 6 | 129 | 137 | 137 |
| 4. Explosives: | | | | | | |
|   (a) Transportation | | 1 | 1 | 1 | 3 | 3 |
|   (b) Charging | | | 1 | | 1 | 1 |
|   (c) Drilling into old holes | | | 1 | 3 | 4 | 4 |
|   (d) Striking in loose rock | | | | 2 | 2 | 2 |
|   (e) Thawing | | | | | | |
|   (f) Caps, detonators, etc | | 1 | 1 | 4 | 6 | 6 |
|   (g) Unguarded shots | | | 1 | 1 | 2 | 2 |
|   (h) Returned too soon | | | 1 | 2 | 3 | 3 |
|   (i) Premature shots | 2 | | | 9 | 9 | 11 |
|   (j) Delayed blast | | | 1 | | 1 | 1 |
|   (k) Miscellaneous | 2 | | | 34 | 34 | 36 |
| 5. Haulage: | | | | | | |
|   (a) Hand and animal | | | | 59 | 59 | 59 |
|   (b) Mechanical | 3 | | | 59 | 59 | 62 |
|   (c) Railway cars and locomotives | 2 | 3 | 12 | 108 | 123 | 125 |
| 6. Falls of persons: | | | | | | |
|   (a) Falling into quarry from surface, benches, or face | 4 | | 3 | 72 | 75 | 79 |
|   (b) Falling from hoists, derricks, ladders, etc | 2 | | 2 | 43 | 45 | 47 |
|   (c) Miscellaneous | 3 | | 1 | 96 | 97 | 100 |
| 7. Falling objects (other than 1 and 2) | 1 | | 4 | 97 | 101 | 102 |
| 8. Flying objects: | | | | | | |
|   (a) From sledging | 1 | | 13 | 278 | 291 | 292 |
|   (b) Others | 1 | | 10 | 115 | 125 | 126 |
| 9. Electricity: | | | | | | |
|   (a) Direct contact with trolley wire | 1 | | | | | 1 |
|   (b) Bar or tool striking trolley wire | | | | 2 | 2 | 2 |
|   (c) Contact with motor | | | | 3 | 3 | 3 |
|   (d) Others | 1 | | | 12 | 12 | 13 |
| 10. Drilling and channelling (by machine or hand) | | | 9 | 192 | 201 | 201 |
| 11. Machinery: | | | | | | |
|   (a) Hoisting cables and attachments | | | 1 | 37 | 38 | 38 |
|   (b) Guys, cranes, derricks, and attachments | 3 | | 7 | 48 | 55 | 58 |
|   (c) Pumps and hoisting engines | | | | 3 | 3 | 3 |
|   (d) Power shovels | 3 | | 3 | 39 | 42 | 45 |
|   (e) Other machinery | 1 | | 4 | 63 | 67 | 68 |
| 12. Stepping on nails, etc | | 1 | 1 | 30 | 32 | 32 |
| 13. Boiler and air-tank explosions | | | | 3 | 3 | 3 |
| 14. Burns | 1 | | 2 | 37 | 39 | 40 |
| 15. Other causes | 2 | 1 | 2 | 223 | 226 | 228 |
|     Total, at open quarry | 45 | 13 | 103 | 3,015 | 3,131 | 3,176 |
| 16. Haulage: | | | | | | |
|   (a) Hand and animal | | | 2 | 39 | 41 | 41 |
|   (b) Mechanical | 1 | 2 | 3 | 39 | 44 | 45 |
|   (c) Railway cars and locomotives | 1 | | 3 | 47 | 50 | 51 |
| 17. Machinery: | | | | | | |
|   (a) Hoisting cables and attachments | | | 7 | 34 | 41 | 41 |
|   (b) Guys, cranes, derricks, and attachments | | | 3 | 25 | 28 | 28 |
|   (c) Pumps and hoisting engines | | | 1 | 6 | 7 | 7 |
|   (d) Crushers | | | 2 | 60 | 62 | 62 |
|   (e) Other machinery | 1 | | 18 | 136 | 154 | 155 |
| 18. Hand tools | | | 4 | 114 | 118 | 118 |
| 19. Stepping on nails | | | | 19 | 19 | 19 |
| 20. Electricity: | | | | | | |
|   (a) Direct contact with trolley wire | | | | 2 | 2 | 2 |
|   (b) Bar or tool striking trolley wire | | | | | | |
|   (c) Contact with motor | | | | 2 | 2 | 2 |
|   (d) Others | 1 | | 2 | 29 | 31 | 32 |
| 21. Falls of persons | 2 | | 2 | 169 | 171 | 173 |
| 22. Falling object (rocks, timbers, etc.) | 2 | | 4 | 200 | 204 | 206 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of 1 foot, leg, hand, or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Disability for more than remainder of day of accident.

TABLE 9.—*All quarries: Accidents by causes and severity of injury, during the year ended Dec. 31, 1931*—Continued

| Cause | Killed | Nonfatal | | | | Grand total |
|---|---|---|---|---|---|---|
| | | Permanent total | Permanent partial | Temporary | Total nonfatal | |
| 23. Flying objects: | | | | | | |
| (a) From sledging | | | | 9 | 136 | 145 | 145 |
| (b) From crushing | | | | 1 | 26 | 27 | 27 |
| (c) Others | | | | 7 | 154 | 161 | 161 |
| 24. Handling-materials: | | | | | | |
| (a) Handling rock by hand | | | | 4 | 230 | 234 | 234 |
| (b) Handling other minerals | | | | 3 | 139 | 142 | 142 |
| 25. Burns | 2 | | | | 119 | 119 | 121 |
| 26. Other causes | 1 | 1 | | 5 | 229 | 235 | 236 |
| Total, at outside works | 11 | 3 | 80 | 1,954 | 2,037 | 2,048 |
| 27. Fall of rock from roof or wall | 2 | | 1 | 38 | 39 | 41 |
| 28. Rock while loading at working face or chute | | | 1 | 47 | 48 | 48 |
| 29. Hand tools | | | | 14 | 14 | 14 |
| 30. Explosives | 1 | | | 6 | 6 | 7 |
| 31. Haulage | | | | 17 | 17 | 17 |
| 32. Falling down chute | | | | 13 | 13 | 13 |
| 33. Run of rock from chute or pocket | | | 1 | 25 | 26 | 26 |
| 34. Drilling | | | | 28 | 28 | 28 |
| 35. Electricity | | | | 3 | 3 | 3 |
| 36. Machinery (other than locomotives or drills) | 2 | | 1 | 5 | 6 | 8 |
| 37. Mine fires | | | | | | |
| 38. Suffocation from natural gases | | | | | | |
| 39. Inrush of water | | | | | | |
| 40. Stepping on nails, etc | | | | 6 | 6 | 6 |
| 41. Handling materials (other than rock) | | | | 18 | 18 | 18 |
| 42. Other causes | | | 1 | 30 | 31 | 31 |
| Total, at underground quarry | 5 | | 5 | 250 | 255 | 260 |
| 43. Falling down shaft or slope | | | | | | |
| 44. Objects falling down shaft or slope | | | | 2 | 2 | 2 |
| 45. Breaking of cables | | | | | | |
| 46. Overwinding | | | | | | |
| 47. Cage, skip, or bucket | | | | 1 | 1 | 2 | 2 |
| 48. Other causes | | | | | | |
| Total, in shaft or slope | | | | 1 | 3 | 4 | 4 |
| Grand total | 61 | 16 | 189 | 5,222 | 5,427 | 5,488 |

TABLE 10.—*All quarries: Causes of fatalities and injuries, showing percentage due to each cause and corresponding rates per million man-hours, during the year ended Dec. 31, 1931*

| Cause of accident | Number killed | | | | Number injured | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of— | | Per million man-hours | | Percent of— | | Per million man-hours | |
| | Grand total | Class total | Grand total | Class total | Grand total | Class total | Grand total | Class total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| Open quarry: | | | | | | | | |
| 1. Falls or slides of rock or overburden | 18.03 | 24.44 | 0.082 | 0.021 | 5.55 | 9.61 | 2.251 | 5,795 |
| 2. Handling material | 1.64 | 2.22 | .007 | .002 | 17.14 | 29.70 | 6.953 | 17.905 |
| 3. Hand tools | | | | | 2.52 | 4.37 | 1.024 | 2.638 |
| 4. Explosives | 6.56 | 8.89 | .030 | .008 | 1.20 | 2.08 | .486 | 1.251 |
| 5. Haulage | 8.20 | 11.11 | .037 | .009 | 4.44 | 7.70 | 1.802 | 4.640 |
| 6. Falls of persons | 14.75 | 20.00 | .068 | .017 | 4.00 | 6.93 | 1.622 | 4.178 |
| 7. Falling objects (other than 1 and 2) | 1.64 | 2.22 | .007 | .003 | 1.86 | 3.23 | .755 | 1.944 |
| 8. Flying objects | 3.28 | 4.45 | .015 | .004 | 7.67 | 13.29 | 3.110 | 8.009 |
| 9. Electricity | 3.28 | 4.45 | .015 | .004 | .31 | .54 | .127 | .327 |

TABLE 10.—*All quarries: Causes of fatalities and injuries, showing percentage due to each cause and corresponding rates per million man-hours, during the year ended Dec. 31, 1931*—Continued

| Cause of accident | Number killed | | | | Number injured | | | |
|---|---|---|---|---|---|---|---|---|
| | Percent of— | | Per million man-hours | | Percent of— | | Per million man-hours | |
| | Grand total | Class total | Grand total | Class total | Grand total | Class total | Grand total | Class total |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
| **Open quarry—Continued** | | | | | | | | |
| 10. Drilling and channeling (by machine or hand) | | | | | 3.70 | 6.42 | 1.503 | 3.870 |
| 11. Machinery | 11.47 | 15.55 | 0.053 | 0.013 | 3.78 | 6.55 | 1.533 | 3.947 |
| 12. Stepping on nails, etc | | | | | .59 | 1.02 | .239 | .616 |
| 13. Boiler and air-tank explosions | | | | | .05 | .10 | .022 | .058 |
| 14. Burns | 1.64 | 2.22 | .007 | .002 | .72 | 1.24 | .292 | .751 |
| 15. Other causes | 3.28 | 4.45 | .015 | .004 | 4.16 | 7.22 | 1.690 | 4.351 |
| Total | 73.77 | 100.00 | .337 | .087 | 57.69 | 100.00 | 23.409 | 60.280 |
| **In outside works:** | | | | | | | | |
| 16. Haulage | 3.28 | 18.18 | .015 | .026 | 2.49 | 6.63 | 1.009 | 1.743 |
| 17. Machinery | 1.64 | 9.09 | .007 | .013 | 5.38 | 14.33 | 2.183 | 3.769 |
| 18. Hand tools | | | | | 2.17 | 5.80 | .882 | 1.523 |
| 19. Stepping on nails, etc | | | | | .35 | .93 | .142 | .245 |
| 20. Electricity | 1.64 | 9.09 | .007 | .013 | .65 | 1.72 | .262 | .452 |
| 21. Falls of persons | 3.28 | 18.18 | .015 | .026 | 3.15 | 8.39 | 1.279 | 2.207 |
| 22. Falling objects (rocks, timbers, etc.) | 3.28 | 18.18 | .015 | .026 | 3.76 | 10.01 | 1.525 | 2.633 |
| 23. Flying objects | | | | | 6.14 | 16.35 | 2.490 | 4.299 |
| 24. Handling materials | | | | | 6.93 | 18.46 | 2.811 | 4.854 |
| 25. Burns | 3.28 | 18.18 | .015 | .026 | 2.19 | 5.84 | .890 | 1.536 |
| 26. Other causes | 1.64 | 9.09 | .007 | .013 | 4.33 | 11.54 | 1.757 | 3.033 |
| Total | 18.03 | 100.00 | .082 | .142 | 37.54 | 100.00 | 15.230 | 26.294 |
| **Underground quarry:** | | | | | | | | |
| 27. Fall of rock from roof or wall | 3.28 | 40.00 | .015 | .461 | .72 | 15.29 | .292 | 8.987 |
| 28. Rock while loading at working face or chute | | | | | .88 | 18.82 | .359 | 11.061 |
| 29. Hand tools | | | | | .26 | 5.49 | .105 | 3.226 |
| 30. Explosives | 1.64 | 20.00 | .007 | .230 | .11 | 2.35 | .045 | 1.382 |
| 31. Haulage | | | | | .31 | 6.67 | .127 | 3.917 |
| 32. Falling down chute, winze, raise, or stope | | | | | .24 | 5.10 | .097 | 2.996 |
| 33. Run of rock from chute or pocket | | | | | .48 | 10.20 | .194 | 5.991 |
| 34. Drilling | | | | | .52 | 10.98 | .209 | 6.452 |
| 35. Electricity | | | | | .06 | 1.18 | .022 | .691 |
| 36. Machinery (other than locomotives or drills) | 3.28 | 40.00 | .015 | .461 | .11 | 2.35 | .045 | 1.382 |
| 37. Mine fires | | | | | | | | |
| 38. Suffocation from natural gases | | | | | | | | |
| 39. Inrush of water | | | | | | | | |
| 40. Stepping on nails, etc | | | | | .11 | 2.35 | .045 | 1.382 |
| 41. Handling materials (other than rock) | | | | | .33 | 7.06 | .135 | 4.148 |
| 42. Other causes | | | | | .57 | 12.16 | .232 | 7.143 |
| Total underground (excluding shaft) | 8.20 | 100.00 | .037 | 1.152 | 4.70 | 100.00 | 1.907 | 58.758 |
| **Shaft or slope:** | | | | | | | | |
| 43. Falling down shaft or slope | | | | | | | | |
| 44. Objects falling down shaft or slope | | | | | .04 | 50.00 | .015 | .461 |
| 45. Breaking of cables | | | | | | | | |
| 46. Overwinding | | | | | | | | |
| 47. Cage, skip, or bucket | | | | | .04 | 50.00 | .015 | .461 |
| 48. Other causes | | | | | | | | |
| Total shaft | | | | | .07 | 100.00 | .030 | .922 |
| Total underground (including shaft) | 8.20 | | .037 | 1.152 | 4.77 | | 1.937 | 59.68 |
| Grand total | 100.00 | | .456 | | 100.00 | | 40.576 | |

## ACCIDENTS AT DIFFERENT KINDS OF QUARRIES

More than half of all men employed inside the quarries in the United States are engaged in quarrying limestone, exclusive of those producing limestone for cement mills, 14 percent work at granite quarries, and about 11 percent quarry cement rock or limestone to be manufactured into cement. On the other hand, the largest number of men engaged on work outside the quarries is employed at cement mills; these comprise 41 percent of the "outside" employees at all quarries. Nearly a third of all outside employees work at limestone quarries. The accident rates for the several classes of operations into which the quarry industry is divided vary widely, the most favorable rates in 1931 being those for the cement industry.

*Cement rock.*—This group, which includes all quarries and mills engaged in the manufacture of cement, has for a number of years been characterized by favorable accident rates. The accident-frequency rate for the group in 1931 was only 12.45 per million man-hours of employment at the quarries and mills, only a little less than one third as high as the accident rate for all classes of quarries and outside plants and about 5 percent lower than the previous year's rate for cement mills and quarries. The plants employed 18,456 men, of whom 3,645 worked in the quarries and 14,811 at the mills and outside the quarries. Men employed were 1,542 fewer than in 1930. The amount of exposure in 1931 was 43,948,493 man-hours, an average of 2,381 hours per employee. Operation per man averaged 269 days in 1931 compared with 298 days in 1930. Accidents resulted in 10 fatalities and 537 nonfatal lost-time injuries.

*Granite quarries.*—An increase of 12 percent was reported in the accident-frequency rate for granite quarries. The number of men employed was about 9 percent less than in the preceding year, while the volume of exposure, as measured by the number of man-shifts of employment, declined approximately 17 percent. The reports showed an average exposure of 1,767 hours per employee. Plants were in operation 220 days per man compared with 240 days in 1930. Six fatalities and 1,110 injuries occurred during the year.

*Limestone quarries.*—A reduction of more than 2 percent in the accident-frequency rate for limestone quarries and outside plants was revealed by reports from operating companies in 1931. The accident rate covering fatalities and injuries was 55.05 per million man-hours of exposure and resulted from 34 fatal accidents and 2,639 injuries. The average accident rate for all kinds of quarry operations was 41.04 per million man-hours. The number of employees, 28,233, represented a decline of 17 percent. The average employee worked 1,720 hours or 201 days. In 1930 the average period of activity was 242 days per employee.

TABLE 11.—*All quarries: Men employed, man-shifts, man-hours worked, and number killed and injured, by kind of quarry, during the year ended Dec. 31, 1931*

| Kind of quarry | Number of quarries | Men employed | | | Man-shifts | | | Man-hours | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total |
| Cement rock | 146 | 3,645 | 14,811 | 18,466 | 814,177 | 4,142,723 | 4,956,900 | 7,113,070 | 36,835,423 | 43,948,493 |
| Granite | 250 | 4,736 | 4,703 | 9,439 | 1,007,929 | 1,069,350 | 2,077,279 | 8,267,120 | 8,411,344 | 16,678,464 |
| Limestone | 763 | 17,970 | 10,263 | 28,233 | 3,415,501 | 2,261,435 | 5,676,936 | 29,093,101 | 19,466,182 | 48,559,283 |
| Marble | 44 | 1,756 | 2,898 | 4,654 | 444,033 | 848,202 | 1,292,235 | 3,953,887 | 7,382,797 | 11,336,684 |
| Sandstone and bluestone | 133 | 1,736 | 1,060 | 2,796 | 265,802 | 214,284 | 480,086 | 2,354,067 | 1,885,798 | 4,239,865 |
| Slate | 58 | 1,268 | 1,093 | 2,361 | 246,742 | 206,412 | 453,154 | 2,147,364 | 1,766,686 | 3,914,050 |
| Trap rock | 136 | 2,110 | 1,151 | 3,261 | 384,246 | 205,667 | 589,913 | 3,351,879 | 1,721,406 | 5,073,285 |
| Total | 1,530 | 33,221 | 35,079 | 69,200 | 6,578,430 | 8,948,073 | 15,526,503 | 56,280,488 | 77,469,636 | 133,750,124 |

| Kind of quarry | Number killed | | | Number injured | | | Widows | Orphans | Rates per million man-hours | | | | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | At quarry | At outside works | Total | At quarry | At outside works | Total | | | Killed | | | Injured | | | At quarry | At outside works | Total |
| | | | | | | | | | At quarry | At outside works | Total | At quarry | At outside works | Total | | | |
| Cement rock | 6 | 4 | 10 | 238 | 299 | 537 | 7 | 19 | 0.84 | 0.11 | 0.23 | 33.46 | 8.12 | 12.22 | 223 | 280 | 269 |
| Granite | 4 | 2 | 6 | 618 | 492 | 1,110 | 4 | 5 | .48 | .24 | .36 | 74.75 | 58.49 | 66.55 | 213 | 227 | 220 |
| Limestone | 31 | 3 | 34 | 1,799 | 840 | 2,639 | 18 | 38 | 1.07 | .15 | .70 | 61.84 | 43.15 | 54.35 | 190 | 220 | 201 |
| Marble | 1 | | 1 | 154 | 190 | 344 | | | .25 | | .09 | 38.95 | 25.74 | 30.34 | 253 | 293 | 278 |
| Sandstone and bluestone | 6 | | 6 | 152 | 52 | 204 | 3 | 1 | 2.55 | | 1.42 | 64.57 | 27.57 | 48.11 | 153 | 202 | 172 |
| Slate | 1 | | 1 | 165 | 65 | 230 | 1 | | .47 | | .26 | 76.84 | 36.79 | 58.76 | 195 | 189 | 192 |
| Trap rock | 1 | 2 | 3 | 264 | 99 | 363 | 3 | 13 | .30 | 1.16 | .59 | 78.76 | 57.51 | 71.55 | 182 | 179 | 181 |
| Total | 50 | 11 | 61 | 3,390 | 2,037 | 5,427 | 36 | 76 | .89 | .14 | .46 | 60.23 | 26.29 | 40.58 | 198 | 249 | 224 |

TABLE 12.—*All quarries: Fatalities and injuries, by causes and kind of quarry, during the year ended Dec. 31, 1931*

Columns 1–15 and their Total are under **Open quarry**; columns 16–26 and their Total are under **At outside works**.

| Kind of quarry | 1 Falls or slides of rock or overburden | 2 Handling materials | 3 Hand tools | 4 Explosives | 5 Haulage | 6 Falls of persons | 7 Falling objects (other than 1 and 2) | 8 Flying objects | 9 Electricity | 10 Drilling and channeling (by machine or hand) | 11 Machinery | 12 Stepping on nails, etc. | 13 Boiler and air-tank explosions | 14 Burns | 15 Other causes | Total | 16 Haulage | 17 Machinery | 18 Hand tools | 19 Stepping on nails, etc. | 20 Electricity | 21 Falls of persons | 22 Falling objects (rocks, timbers, etc.) | 23 Flying objects | 24 Handling materials | 25 Burns | 26 Other causes | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Killed:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 2 | | | | | 1 | | | 1 | | | | | | | 4 | | | | | | 2 | | | | 2 | | 4 |
| Granite | 2 | | | | | | | | | | 1 | | | | 1 | 4 | | 1 | | | | | 1 | | | | | 2 |
| Limestone | 5 | 1 | | 3 | 4 | 8 | 1 | 2 | 1 | | 3 | | | 1 | 1 | 30 | 1 | | | | 1 | | 1 | | | | | 3 |
| Marble | | | | | | | | | | | 1 | | | | | 1 | | | | | | | | | | | | |
| Sandstone and bluestone | 1 | | | 1 | 1 | | | | | | 1 | | | | | 4 | | | | | | | | | | | | |
| Slate | 1 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
| Trap rock | | | | | | | | | | | 1 | | | | | 1 | 1 | | | | | | | | | | 1 | 2 |
| Total | 11 | 1 | | 4 | 5 | 9 | 1 | 2 | 2 | | 7 | | | 1 | 2 | 45 | 2 | 1 | | | 1 | 2 | 2 | | | 2 | 1 | 11 |
| **Injured:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 9 | 38 | 4 | 1 | 14 | 10 | 1 | 12 | 1 | 6 | 6 | | | 2 | 5 | 109 | 21 | 42 | 16 | 2 | 13 | 39 | 39 | 21 | 38 | 26 | 42 | 299 |
| Granite | 73 | 130 | 30 | 12 | 22 | 50 | 18 | 109 | 5 | 73 | 47 | 2 | 1 | 2 | 44 | 618 | 14 | 52 | 34 | 4 | 6 | 17 | 26 | 181 | 87 | 5 | 66 | 492 |
| Limestone | 180 | 516 | 65 | 40 | 177 | 99 | 57 | 212 | 10 | 86 | 118 | 21 | 1 | 29 | 132 | 1,743 | 82 | 136 | 44 | 10 | 5 | 74 | 94 | 87 | 137 | 83 | 88 | 840 |
| Marble | 1 | 31 | 11 | | 5 | 8 | 3 | 14 | | 14 | 5 | 2 | | 1 | 12 | 107 | 7 | 25 | 10 | | | 24 | 25 | 19 | 65 | | 15 | 190 |
| Sandstone and bluestone | 10 | 54 | 6 | 3 | 4 | 14 | 5 | 19 | | 4 | 11 | 1 | | | 10 | 141 | 3 | 7 | 4 | | | 2 | 4 | 9 | 9 | | 14 | 52 |
| Slate | 11 | 77 | 8 | 4 | 6 | 13 | 4 | 5 | | 2 | 5 | 1 | | 3 | 10 | 149 | 5 | 5 | 3 | 1 | 4 | 8 | 4 | 2 | 29 | | 4 | 65 |
| Trap rock | 17 | 84 | 13 | 5 | 13 | 23 | 13 | 45 | 1 | 16 | 13 | 5 | 1 | 2 | 13 | 264 | 3 | 25 | 7 | 2 | 7 | 7 | 12 | 14 | 11 | 5 | 6 | 99 |
| Total | 301 | 930 | 137 | 65 | 241 | 217 | 101 | 416 | 17 | 201 | 205 | 32 | 3 | 39 | 226 | 3,131 | 135 | 292 | 118 | 19 | 35 | 171 | 204 | 333 | 376 | 119 | 235 | 2,037 |

Column legend (Underground quarry):
- 27 = Fall of rock from roof or wall
- 28 = Rock while loading at working face or chute
- 29 = Hand tools
- 30 = Explosives
- 31 = Haulage
- 32 = Falling down chute, winze, raise, or stope
- 33 = Run of rock from chute or pocket
- 34 = Drilling
- 35 = Electricity
- 36 = Machinery (other than locomotives or drills)
- 37 = Mine fires
- 38 = Suffocation from natural gases
- 39 = Inrush of water
- 40 = Stepping on nails, etc.
- 41 = Handling materials (other than rock)
- 42 = Other causes

Column legend (Shaft or slope):
- 43 = Falling down shaft or slope
- 44 = Objects falling down shaft or slope
- 45 = Breaking of cables
- 46 = Overwinding
- 47 = Cage, skip, or bucket
- 48 = Other causes

| Kind of quarry | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | Total | 43 | 44 | 45 | 46 | 47 | 48 | Total | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Killed:** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 1 | | | | | | | | | 1 | | | | | | | 2 | | | | | | | | 10 |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| Limestone | 1 | | | | | | | | | 1 | | | | | | | 2 | | | | | | | | 34 |
| Marble | | | | 1 | | | | | | | | | | | | | 1 | | | | | | | | 1 |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| Slate | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Total | 2 | | | 1 | | | | | | 2 | | | | | | | 5 | | | | | | | | 61 |
| **Injured:** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 23 | 21 | 7 | 4 | 6 | 8 | 25 | 18 | 2 | 1 | | | | 2 | 6 | 6 | 129 | | 2 | | | 2 | | 4 | 537 |
| Granite | 9 | 16 | 2 | 1 | 6 | | 1 | 6 | 1 | | | | | 1 | 2 | 7 | 52 | | | | | | | | 1,110 |
| Limestone | 1 | 3 | 5 | 1 | 2 | 4 | | 3 | | 3 | | | | 3 | 6 | 16 | 47 | | | | | | | | 2,639 |
| Marble | 3 | | | | | 1 | | 1 | | 1 | | | | | 3 | 2 | 11 | | | | | | | | 344 |
| Sandstone and bluestone | 3 | 8 | | | 3 | | | | | 1 | | | | | 1 | | 16 | | | | | | | | 204 |
| Slate | | | | | | | | | | | | | | | | | | | | | | | | | 230 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 363 |
| Total | 39 | 48 | 14 | 6 | 17 | 13 | 26 | 28 | 3 | 6 | | | | 6 | 18 | 31 | 255 | | 2 | | | 2 | | 4 | 5,427 |

TABLE 13.—All quarries: Fatalities and injuries, classified by kind of quarry and severity of injury, during the year ended Dec. 31, 1931

[No accidents occurred in classes of quarries not listed]

| Kind of quarry / severity of injury | 1 Falls or slides of rock or overburden | 2(a) Handling rock at face | 2(b) Handling other material | 3 Hand tools | 4(a) Transportation | 4(b) Charging | 4(c) Drilling into old holes | 4(d) Striking in loose rock | 4(e) Thawing | 4(f) Caps, detonators, etc. | 4(g) Unguarded shots | 4(h) Returned too soon | 4(i) Premature shots | 4(j) Delayed blast | 4(k) Miscellaneous | 5(a) Hand and animal | 5(b) Mechanical | 5(c) Railway cars and locomotives | 6(a) Falling into quarry from surface, benches, or face | 6(b) Falling from hoists, derricks, ladders, etc. | 6(c) Miscellaneous | 7 Falling objects (other than 1 and 2) | 8(a) From sledging | 8(b) Others | 9(a) Direct contact with trolley wire | 9(b) Bar or tool, striking trolley wire | 9(c) Contact with motor | 9(d) Others | 10 Drilling and channeling (by machine or hand) | 11(a) Hoisting cables and attachments | 11(b) Guys, cranes, derricks, and attachments | 11(c) Pumps and hoisting engines | 11(d) Power shovels | 11(e) Other machinery | 12 Stepping on nails, etc. | 13 Boiler and air-tank explosions | 14 Burns | 15 Other causes | Total in and about quarry, 1931 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Killed:** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 4 |
| Granite | 2 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | 4 |
| Limestone | 5 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | 2 | 2 | 3 | 2 | 3 | 1 | 1 | 1 | 1 | - | - | 1 | - | - | 1 | - | 1 | 1 | - | - | 1 | 1 | 30 |
| Marble | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | 1 | - |
| Sandstone and bluestone | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| Slate | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| Trap rock | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | 1 |
| Total | 11 | 1 | - | - | - | - | - | - | - | - | - | - | 2 | - | - | - | 3 | 2 | 4 | 2 | 3 | 1 | 1 | 1 | 1 | - | - | 1 | - | - | 3 | - | 3 | 1 | - | - | 1 | 2 | 45 |

| | Total |
|---|---|
| **Permanent total:[1]** | |
| Cement rock | |
| Granite | 12 |
| Limestone | 1 |
| Sandstone and bluestone | |
| Total | 13 |
| **Permanent partial:[2]** | |
| Cement rock | 8 |
| Granite | 10 |
| Limestone | 74 |
| Marble | 5 |
| Sandstone and bluestone | 2 |
| Slate | 2 |
| Trap rock | 2 |
| Total | 103 |
| **Temporary:[3]** | |
| Cement rock | 101 |
| Granite | 608 |
| Limestone | 1,657 |
| Marble | 102 |
| Sandstone and bluestone | 138 |
| Slate | 147 |
| Trap rock | 262 |
| Total | 3,015 |
| **All quarries:** | |
| Killed | 45 |
| Permanent total[1] | 13 |
| Permanent partial[2] | 103 |
| Temporary[3] | 3,015 |
| Total, nonfatal | 3,131 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of 1 foot, leg, hand, or eye, 1 or more toes, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Disability for more than remainder of day of accident.

TABLE 13.—All quarries: Fatalities and injuries, classified by kind of quarry and severity of injury, during the year ended Dec. 31, 1931—Con.

**At outside works**

| Kind of quarry and severity of injury | Haulage (16) — (a) Hand and animal | Haulage (16) — (b) Mechanical | Haulage (16) — (c) Railway cars and locomotives | Machinery (17) — (a) Hoisting cables and attachments | Machinery (17) — (b) Guys, cranes, derricks, and attachments | Machinery (17) — (c) Pumps and hoisting engines | Machinery (17) — (d) Crushers | Machinery (17) — (e) Other machinery | Hand tools (18) | Stepping on nails, etc. (19) | Electricity (20) — (a) Direct contact with trolley wire | Electricity (20) — (b) Bar or tool striking trolley wire | Electricity (20) — (c) Contact with motor | Electricity (20) — (d) Others | Falls of persons (21) | Falling objects (rocks, timbers, etc.) (22) | Flying objects (23) — (a) From sledging | Flying objects (23) — (b) From crushing | Flying objects (23) — (c) Others | Handling materials (24) — (a) Handling rock by hand | Handling materials (24) — (b) Handling other materials | Burns (25) | Other causes (26) | Total outside works, 1931 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Killed:** | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | | | | | | | | | | | | | | | 2 | | | | | | | 2 | | 4 |
| Granite | | | | | | | | | | | | | | 1 | | 1 | | | | | | | 1 | 2 |
| Limestone | | 1 | 1 | | | | | | | | | | | | | 1 | | | | | | | | 3 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | |
| Slate | | | | | | | | 1 | | | | | | 1 | | | | | | | | | | 2 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | |
| Total | | 1 | 1 | | | | | 1 | | | | | | 1 | 2 | 2 | | | | | | 2 | 1 | 11 |
| **Permanent total:**[1] | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | | | | | | | | | | | | | | | | | | | | | | | 1 | 1 |
| Granite | | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | |
| Sandstone and bluestone | | 1 | | | | | | | | | | | | | | | | | | | | | | 1 |
| Total | | 2 | | | | | | | | | | | | | | | | | | | | | 1 | 3 |

| | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Permanent partial:** [2] | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | | | | 3 | | 1 | | 5 | | | | | | 1 | | 1 | 2 | | 2 | | 1 | | 4 | 20 |
| Granite | | | | 2 | | | 1 | 2 | | | | | | | | 3 | 4 | | 3 | | | | | 15 |
| Limestone | 2 | 2 | 2 | 2 | 1 | | | 6 | 4 | | | | | | 2 | | 3 | 1 | 2 | 2 | 1 | | 1 | 32 |
| Marble | | | | | | | | 2 | | | | | | | | | | | | 1 | | | | 3 |
| Sandstone and bluestone | | | | | 1 | | 1 | | | | | | | | | | | | | 1 | 1 | | | 4 |
| Slate | | | | | | | | 1 | | | | | | 1 | | | | | | | | | | 2 |
| Trap rock | | | 1 | | 1 | | | 2 | | | | | | | | | | | | | | | | 4 |
| Total | 2 | 2 | 3 | 7 | 3 | 1 | 2 | 18 | 4 | | | | | 2 | 2 | 4 | 9 | 1 | 7 | 4 | 3 | | 5 | 80 |
| Temporary: [3] | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 3 | 4 | 14 | 3 | 2 | | 9 | 19 | 16 | 2 | | | | 12 | 39 | 38 | 4 | 1 | 12 | 2 | 35 | 26 | 37 | 278 |
| Granite | 5 | 8 | | 4 | 5 | | 10 | 28 | 34 | 4 | | | | 6 | 17 | 23 | 96 | 1 | 77 | 69 | 18 | 5 | 66 | 476 |
| Limestone | 26 | 19 | 29 | 14 | 12 | 6 | 28 | 67 | 40 | 10 | | | 2 | 3 | 72 | 94 | 22 | 19 | 40 | 62 | 72 | 83 | 87 | 807 |
| Marble | 3 | 3 | 1 | 9 | 4 | | 1 | 9 | 10 | | | | | | 24 | 25 | 5 | | 14 | 58 | 6 | | 15 | 187 |
| Sandstone and bluestone | | 2 | 1 | 2 | | | 2 | 1 | 4 | | | | | | 2 | 4 | 4 | 1 | 4 | 6 | 1 | | 14 | 48 |
| Slate | 2 | 2 | 1 | | 1 | | | 3 | 3 | 1 | 2 | | | 1 | 8 | 4 | 1 | | 1 | 25 | 4 | | 4 | 63 |
| Trap rock | | 1 | 1 | 2 | 1 | | 10 | 9 | 7 | 2 | | | | 7 | 7 | 12 | 4 | 4 | 6 | 8 | 3 | 5 | 6 | 95 |
| Total | 39 | 39 | 47 | 34 | 25 | 6 | 60 | 136 | 114 | 19 | 2 | | 2 | 29 | 169 | 200 | 136 | 26 | 154 | 230 | 139 | 119 | 229 | 1,954 |
| All quarries: | | | | | | | | | | | | | | | | | | | | | | | | |
| Killed | | 1 | 1 | | | | | 1 | | | | | | 1 | 2 | 2 | | | | | | 2 | 1 | 11 |
| Permanent total [1] | | 2 | | | | | | | | | | | | | | | | | | | | | 1 | 3 |
| Permanent partial [2] | 2 | 3 | 3 | 7 | 3 | 1 | 2 | 18 | 4 | | | | | 2 | 2 | 4 | 9 | 1 | 7 | 4 | 3 | | 5 | 80 |
| Temporary [3] | 39 | 39 | 47 | 34 | 25 | 6 | 60 | 136 | 114 | 19 | 2 | | 2 | 29 | 169 | 200 | 136 | 26 | 154 | 230 | 139 | 119 | 129 | 1,954 |
| Total, nonfatal | 41 | 44 | 50 | 41 | 28 | 7 | 62 | 154 | 118 | 19 | 2 | 0 | 2 | 31 | 171 | 204 | 145 | 27 | 161 | 234 | 142 | 119 | 235 | 2,037 |

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[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of 1 foot, leg, hand, or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Disability for more than remainder of day of accident.

TABLE 13.—*All quarries: Fatalities and injuries, classified by kind of quarry and severity of injury, during the year ended Dec. 31, 1931*—Con.

| Kind of quarry and severity of injury | Underground quarry | | | | | | | | | | | | | | | | | Shaft or slope | | | | | | | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 27 Fall of rock from roof or wall | 28 Rock while loading at working face or chute | 29 Hand tools | 30 Explosives | 31 Haulage | 32 Falling down chute, winze, raise or slope | 33 Run of rock from chute or pocket | 34 Drilling | 35 Electricity | 36 Machinery (other than locomotives or drills) | 37 Mine fires | 38 Suffocation from natural gases | 39 Inrush of water | 40 Stepping on nails, etc. | 41 Handling materials, (other than rock) | 42 Other causes | Total | 43 Falling down shaft slope | 44 Objects falling down shaft or slope | 45 Breaking of cables | 46 Overwinding | 47 Cage, skip, or bucket | 48 Other causes | Total | |
| **Killed:** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 1 | | | | | | | | | | | | | | | | | | | | | | | | 10 |
| Granite | 1 | | | | | | | | | 1 | | | | | | | | | | | | | | | 6 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | | 34 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Sandstone and bluestone | | | | 1 | | | | | | 1 | | | | | | | | | | | | | | | 6 |
| Slate | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Total | 2 | | | 1 | | | | | | 2 | | | | | | | 5 | | | | | | | | 61 |
| **Permanent total:[1]** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Limestone | | | | | | | | | | 1 | | | | | | | | | | | | | | | 13 |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Total | | | | | | | | | | 1 | | | | | | | 2 | | | | | | | | 16 |
| **Permanent partial:[2]** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 1 | | | | | | | | | | | | | | | | | | | | | | | | 30 |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 25 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | | 108 |
| Marble | | 1 | | | | | 1 | | | 1 | | | | | | 1 | | | | | | 1 | | 1 | 9 |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| Slate | | | | | | | | | | | | | | | | | | | | | | | | | 5 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 6 |
| Total | 1 | 1 | | | | | 1 | | | 1 | | | | | | 1 | 5 | | | | | 1 | | 1 | 189 |

| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Temporary:[3]** | | | | | | | | | | | | | | | | | |
| Cement rock | 22 | 21 | 7 | 4 | 6 | 8 | 24 | 18 | 2 | 1 | 2 | 6 | 6 | 127 | 2 | 3 | 506 |
| Granite | | | | | | | | | | | | | | 51 | | | 1,084 |
| Limestone | | | | | | | | | | | | | | 46 | | | 2,518 |
| Marble | | | | | | | | | | | | | | 11 | | | 335 |
| Sandstone and bluestone | | | | | | | | | | | | | | 15 | | | 197 |
| Slate | | | | | | | | | | | | | | | | | 225 |
| Trap rock | | | | | | | | | | | | | | | | | 357 |
| Total | 38 | 47 | 14 | 6 | 17 | 13 | 25 | 28 | 3 | 5 | 6 | 18 | 30 | 250 | 2 | 3 | 5,222 |
| **All quarries:** | | | | | | | | | | | | | | | | | |
| Killed | | | | | | | | | | | | | | | | | 61 |
| Permanent total[1] | | | | | | | | | | | | | | | | | 16 |
| Permanent partial[2] | | | | | | | | | | | | | | 5 | | | 189 |
| Temporary[3] | 38 | 47 | 14 | 6 | 17 | 13 | 25 | 28 | 3 | 5 | 6 | 18 | 30 | 250 | 2 | 3 | 5,222 |
| Total nonfatal | 39 | 48 | 14 | 6 | 17 | 13 | 26 | 28 | 3 | 6 | 6 | 18 | 31 | 255 | 2 | 4 | 5,427 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.

[2] Permanent partial disability: Loss of 1 foot, leg, hand, or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.

[3] Disability for more than remainder of day of accident.

*Marble quarries.*—Quarries engaged in producing marble and stone-dressing plants connected with such quarries had an accident frequency of 30.43 per million man-hours of exposure in 1931. This rate, which covered fatal and nonfatal accidents, was 13 percent more favorable than the previous year's accident rate and approximately 26 percent lower than the combined rate for all classes of quarries. Marble quarrying ranked next to the cement industry in 1931 in low accident-frequency rate. These two branches of the industry were the only groups whose accident rates were more favorable than the average rate for all quarries combined. Accidents at marble quarries and "outside" plants resulted in 344 injuries and only 1 fatality during 1931. The average number of men employed was 4,654, a reduction of 1,433 from 1930. Exposure to risk was 11,336,684 man-hours, an average of 2,436 hours per man employed. The quarries and outside plants were in operation an average of 278 days, 2 days more per man than in 1930.

*Sandstone and bluestone quarries.*—The accident-frequency rate for this branch of quarrying increased 5½ percent over the rate for the previous year. The accident rate was 49.53 per million man-hours of exposure, of which 1.42 represented fatalities and 48.11 nonfatal injuries. Aggregate exposure of all employees was 4,239,865 man-hours, an average of 1,516 hours per employee. The plants were in operation an average of 172 days per man compared with 212 days in 1930. Accidents resulted in 6 deaths and 204 nonfatal injuries. Of 2,796 men employed at all plants, 1,736 worked in and about the quarries and the remainder at the outside plants on stone-dressing or other work.

*Slate quarries.*—The accident frequency for slate quarries in 1931 was 59.02 per million man-hours of exposure—the same rate that prevailed during 1930. One fatality and 230 nonfatal lost-time injuries were reported among the 2,361 men employed. The accident rate of 59.02 for slate quarries may be compared with a rate of 41.04 for all classes of quarries combined. A total of 3,914,050 man-hours represented the aggregate amount of exposure at slate quarries in 1931, and this volume of work averaged 1,658 hours per man employed. The plants were in operation 192 days per man, 24 days less per man than in the preceding year.

*Trap-rock quarries.*—Quarries engaged in producing trap rock reported a reduction of 4 percent in their accident-frequency rate in 1931 compared with 1930. The rate for 1931 resulted from 3 fatalities and 363 nonfatal lost-time injuries that occurred in connection with the performance of 5,073,285 man-hours of work. Of 3,261 men employed, 2,110 worked in the quarries and 1,151 were engaged in crushing the rock and on other work outside the quarries. The accident rate for trap-rock quarries was considerably higher than the combined rate for all quarries, as indicated not only by the figures for 1931 but also by those for previous years.

TABLE 14.—*Cement-rock, marble, slate, and trap-rock quarries: Men employed and man-shifts by States, during the year ended Dec. 31, 1931*

| State | Number of quarries | Men employed | | | Man-shifts | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total |
| **Cement rock:** | | | | | | | | | | |
| California | 8 | 298 | 977 | 1,275 | 77,174 | 308,188 | 385,362 | 259 | 315 | 302 |
| Illinois | 5 | 218 | 964 | 1,182 | 56,689 | 264,804 | 321,493 | 260 | 275 | 272 |
| Kansas | 8 | 134 | 503 | 637 | 25,323 | 133,165 | 158,488 | 189 | 265 | 249 |
| New York | 12 | 282 | 1,033 | 1,315 | 67,603 | 313,905 | 381,508 | 240 | 304 | 290 |
| Pennsylvania | 23 | 715 | 2,787 | 3,502 | 160,770 | 754,607 | 915,377 | 225 | 271 | 261 |
| Not segregated | 90 | 1,998 | 8,547 | 10,545 | 426,618 | 2,368,054 | 2,794,672 | 214 | 277 | 265 |
| Total | 146 | 3,645 | 14,811 | 18,456 | 814,177 | 4,142,723 | 4,956,900 | 223 | 280 | 269 |
| **Marble:** | | | | | | | | | | |
| California | 6 | 30 | 11 | 41 | 6,486 | 2,967 | 9,453 | 216 | 270 | 231 |
| Massachusetts | 3 | 24 | 47 | 71 | 6,806 | 12,550 | 19,356 | 284 | 267 | 273 |
| Tennessee | 13 | 797 | 580 | 1,377 | 190,730 | 160,872 | 351,602 | 239 | 277 | 255 |
| Not segregated | 22 | 905 | 2,260 | 3,165 | 240,011 | 671,813 | 911,824 | 265 | 297 | 288 |
| Total | 44 | 1,756 | 2,898 | 4,654 | 444,033 | 848,202 | 1,292,235 | 253 | 293 | 278 |
| **Slate:** | | | | | | | | | | |
| Pennsylvania | 27 | 763 | 743 | 1,506 | 150,010 | 147,959 | 297,969 | 197 | 199 | 198 |
| Vermont | 16 | 171 | 57 | 228 | 40,349 | 12,330 | 52,679 | 236 | 216 | 231 |
| Virginia | 3 | 199 | 137 | 336 | 31,091 | 21,421 | 52,512 | 156 | 156 | 156 |
| Not segregated | 12 | 135 | 156 | 291 | 25,292 | 24,702 | 49,994 | 187 | 158 | 172 |
| Total | 58 | 1,268 | 1,093 | 2,361 | 246,742 | 206,412 | 453,154 | 195 | 189 | 192 |
| **Trap rock:** | | | | | | | | | | |
| California | 31 | 252 | 254 | 506 | 47,716 | 40,712 | 88,428 | 189 | 160 | 175 |
| Connecticut | 11 | 250 | 53 | 303 | 53,191 | 11,122 | 64,313 | 213 | 210 | 212 |
| Maryland | 6 | 172 | 51 | 223 | 32,474 | 9,367 | 41,841 | 189 | 184 | 188 |
| Massachusetts | 17 | 321 | 127 | 448 | 55,912 | 19,781 | 75,693 | 174 | 156 | 169 |
| New Jersey | 26 | 501 | 247 | 748 | 86,120 | 42,731 | 128,851 | 172 | 173 | 172 |
| New York | 3 | 94 | 87 | 181 | 14,637 | 14,225 | 28,862 | 156 | 164 | 159 |
| Pennsylvania | 16 | 198 | 251 | 449 | 38,583 | 53,366 | 91,949 | 195 | 213 | 205 |
| Washington | 9 | 94 | 13 | 107 | 12,271 | 1,823 | 14,094 | 131 | 140 | 132 |
| Not segregated | 17 | 228 | 68 | 296 | 43,342 | 12,540 | 55,882 | 190 | 184 | 189 |
| Total | 136 | 2,110 | 1,151 | 3,261 | 384,246 | 205,667 | 589,913 | 182 | 179 | 181 |

TABLE 15.—*Cement-rock, marble, slate, and trap-rock quarries: Man-hours and number killed and injured, by States, during the year ended Dec. 31, 1931*

| State | Man-hours | | | Number killed | | | Number injured | | | Widows | Orphans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total | | |
| **Cement rock:** | | | | | | | | | | | |
| California | 633,304 | 2,511,987 | 3,145,291 | | | | 128 | 61 | 189 | | |
| Illinois | 462,396 | 2,264,264 | 2,726,660 | | | | 6 | 15 | 21 | | |
| Kansas | 200,908 | 1,146,796 | 1,347,704 | | | | 3 | 7 | 10 | | |
| New York | 606,273 | 2,907,628 | 3,513,901 | | 1 | 1 | 9 | 11 | 20 | | |
| Pennsylvania | 1,423,051 | 6,655,512 | 8,078,563 | 3 | 1 | 4 | 7 | 37 | 44 | 3 | 17 |
| Not segregated | 3,787,138 | 21,349,236 | 25,136,374 | 3 | 2 | 5 | 85 | 168 | 253 | 4 | 2 |
| Total | 7,113,070 | 36,835,423 | 43,948,493 | 6 | 4 | 10 | 238 | 299 | 537 | 7 | 19 |
| **Marble:** | | | | | | | | | | | |
| California | 51,888 | 23,736 | 75,624 | | | | 4 | 1 | 5 | | |
| Massachusetts | 56,248 | 101,900 | 158,148 | | | | 1 | 1 | 2 | | |
| Tennessee | 1,792,866 | 1,609,600 | 3,402,466 | | | | 43 | 50 | 93 | | |
| Not segregated | 2,052,885 | 5,647,561 | 7,700,446 | 1 | | 1 | 106 | 138 | 244 | | |
| Total | 3,953,887 | 7,382,797 | 11,336,684 | 1 | | 1 | 154 | 190 | 344 | | |

TABLE 15.—*Cement-rock, marble, slate, and trap-rock quarries: Man-hours and number killed and injured, by States, during the year ended Dec. 31, 1931*—Con.

| State | Man-hours | | | Number killed | | | Number injured | | | Wid-ows | Or-phans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | At quarry | At outside works | Total | At quar-ry | At out-side works | Total | At quar-ry | At out-side works | Total | | |
| Slate: | | | | | | | | | | | |
| Pennsylvania | 1,247,411 | 1,222,922 | 2,470,333 | ------ | ------ | ------ | 88 | 49 | 137 | ------ | ------ |
| Vermont | 363,141 | 110,970 | 474,111 | ------ | ------ | ------ | 13 | 4 | 17 | ------ | ------ |
| Virginia | 310,910 | 214,210 | 525,120 | ------ | ------ | ------ | 30 | 2 | 32 | ------ | ------ |
| Not segregated | 225,902 | 218,584 | 444,486 | 1 | ------ | 1 | 34 | 10 | 44 | 1 | ------ |
| Total | 2,147,364 | 1,776,686 | 3,914,050 | 1 | ------ | 1 | 165 | 65 | 230 | 1 | ------ |
| Trap rock: | | | | | | | | | | | |
| California | 386,186 | 328,135 | 714,321 | ------ | ------ | ------ | 38 | 32 | 70 | ------ | ------ |
| Connecticut | 463,421 | 98,750 | 562,171 | ------ | 1 | 1 | 20 | 6 | 26 | 1 | 4 |
| Maryland | 291,606 | 85,353 | 376,959 | ------ | 1 | 1 | 30 | 8 | 38 | 1 | 4 |
| Massachusetts | 497,880 | 181,505 | 679,385 | ------ | ------ | ------ | 81 | 14 | 95 | ------ | ------ |
| New Jersey | 742,883 | 392,319 | 1,135,202 | ------ | ------ | ------ | 37 | 13 | 50 | ------ | ------ |
| New York | 120,494 | 120,110 | 240,604 | ------ | ------ | ------ | 7 | 8 | 15 | ------ | ------ |
| Pennsylvania | 349,717 | 383,736 | 733,453 | 1 | ------ | 1 | 34 | 14 | 48 | 1 | 5 |
| Washington | 98,168 | 14,584 | 112,752 | ------ | ------ | ------ | 14 | 2 | 16 | ------ | ------ |
| Not segregated | 401,524 | 116,914 | 518,438 | ------ | ------ | ------ | 3 | 2 | 5 | ------ | ------ |
| Total | 3,351,879 | 1,721,406 | 5,073,285 | 1 | 2 | 3 | 264 | 99 | 363 | 3 | 13 |

TABLE 16.—*Granite quarries: Men employed and man-shifts, by States, during the year ended Dec. 31, 1931*

| State | Num-ber of quar-ries | Men employed | | | Man-shifts | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | At quar-ry | At out-side works | Total | At quar-ry | At out-side works | Total | At quar-ry | At out-side works | Total |
| California | 29 | 470 | 611 | 1,081 | 94,039 | 88,581 | 182,620 | 200 | 145 | 169 |
| Connecticut | 9 | 118 | 80 | 198 | 31,342 | 7,990 | 39,332 | 266 | 100 | 199 |
| Georgia | 14 | 407 | 329 | 736 | 78,775 | 90,576 | 169,351 | 194 | 275 | 230 |
| Maine | 22 | 484 | 471 | 955 | 101,925 | 111,876 | 213,801 | 211 | 238 | 224 |
| Massachusetts | 30 | 470 | 807 | 1,277 | 99,239 | 200,707 | 299,946 | 211 | 249 | 235 |
| Minnesota | 21 | 236 | 653 | 889 | 47,927 | 166,499 | 214,426 | 203 | 255 | 241 |
| New Hampshire | 15 | 177 | 393 | 570 | 36,136 | 93,761 | 129,897 | 204 | 239 | 228 |
| North Carolina | 12 | 509 | 433 | 942 | 120,335 | 103,236 | 223,571 | 236 | 238 | 237 |
| Oregon | 5 | 23 | 19 | 42 | 4,265 | 3,864 | 8,129 | 185 | 203 | 194 |
| Pennsylvania | 7 | 71 | 25 | 96 | 14,262 | 6,034 | 20,296 | 201 | 241 | 211 |
| Rhode Island | 6 | 48 | 67 | 115 | 12,098 | 16,175 | 28,273 | 252 | 241 | 246 |
| Texas | 6 | 94 | 14 | 108 | 19,610 | 3,830 | 23,440 | 209 | 274 | 217 |
| Vermont | 18 | 779 | 78 | 857 | 189,593 | 20,614 | 210,207 | 243 | 264 | 245 |
| Virginia | 4 | 209 | 37 | 246 | 35,847 | 9,658 | 45,505 | 172 | 261 | 185 |
| Washington | 6 | 32 | 12 | 44 | 5,259 | 2,360 | 7,619 | 164 | 197 | 173 |
| Wisconsin | 16 | 233 | 403 | 636 | 45,291 | 84,286 | 129,577 | 194 | 209 | 204 |
| Not segregated | 30 | 376 | 271 | 647 | 71,986 | 59,303 | 131,289 | 191 | 219 | 203 |
| Total | 250 | 4,736 | 4,703 | 9,439 | 1,007,929 | 1,069,350 | 2,077,279 | 213 | 227 | 220 |

TABLE 17.—*Granite quarries: Man-hours and number killed and injured, by States, during the year ended Dec. 31, 1931*

| State | Man-hours | | | Number killed | | | Number injured | | | Widows | Orphans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In and about quarry | In outside works | Total | In and about quarry | In outside works | Total | In and about quarry | In outside works | Total | | |
| California | 699,240 | 469,943 | 1,169,183 | 1 | ------ | 1 | 74 | 19 | 93 | ------ | ------ |
| Connecticut | 255,236 | 63,920 | 319,156 | ------ | ------ | ------ | 9 | 4 | 13 | ------ | ------ |
| Georgia | 662,993 | 725,382 | 1,388,375 | ------ | ------ | ------ | 17 | 13 | 30 | ------ | ------ |
| Maine | 816,504 | 895,008 | 1,711,512 | ------ | ------ | ------ | 80 | 25 | 105 | ------ | ------ |
| Massachusetts | 798,412 | 1,638,822 | 2,437,234 | 1 | ------ | 1 | 77 | 69 | 146 | 1 | ------ |
| Minnesota | 386,216 | 1,332,552 | 1,718,768 | ------ | ------ | ------ | 35 | 84 | 119 | ------ | ------ |
| New Hampshire | 289,088 | 750,088 | 1,039,176 | ------ | ------ | ------ | 15 | 39 | 54 | ------ | ------ |
| North Carolina | 985,450 | 845,283 | 1,830,733 | ------ | ------ | ------ | 46 | 51 | 97 | ------ | ------ |
| Oregon | 34,120 | 30,912 | 65,032 | ------ | 1 | 1 | ------ | 5 | 5 | ------ | ------ |
| Pennsylvania | 126,030 | 55,128 | 181,158 | ------ | ------ | ------ | 9 | 1 | 10 | ------ | ------ |
| Rhode Island | 97,384 | 129,850 | 227,234 | ------ | ------ | ------ | 3 | 5 | 8 | ------ | ------ |
| Texas | 188,550 | 30,640 | 219,190 | ------ | ------ | ------ | 12 | 7 | 19 | ------ | ------ |
| Vermont | 1,516,744 | 164,912 | 1,681,656 | 1 | ------ | 1 | 57 | 28 | 85 | 1 | 1 |
| Virginia | 325,095 | 87,540 | 412,635 | ------ | ------ | ------ | 14 | 5 | 19 | ------ | ------ |
| Washington | 42,072 | 18,880 | 60,952 | ------ | ------ | ------ | 3 | ------ | 3 | ------ | ------ |
| Wisconsin | 373,246 | 687,523 | 1,060,769 | ------ | ------ | ------ | 49 | 96 | 145 | ------ | ------ |
| Not segregated | 670,740 | 484,961 | 1,155,701 | 1 | 1 | 2 | 118 | 41 | 159 | 2 | 4 |
| Total | 8,267,120 | 8,411,344 | 16,678,464 | 4 | 2 | 6 | 618 | 492 | 1,110 | 4 | 5 |

TABLE 18.—*Limestone quarries: Men employed and man-shifts, by States, during the year ended Dec. 31, 1931*

| State | Number of quarries | Men employed | | | Man-shifts | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total |
| Alabama | 15 | 576 | 459 | 1,035 | 68,309 | 113,325 | 181,634 | 119 | 247 | 175 |
| Arkansas | 5 | 114 | 46 | 160 | 19,661 | 6,807 | 26,468 | 172 | 148 | 165 |
| California | 29 | 212 | 164 | 376 | 42,099 | 42,514 | 84,613 | 199 | 259 | 225 |
| Colorado | 7 | 87 | 11 | 98 | 13,699 | 1,690 | 15,389 | 157 | 154 | 157 |
| Georgia | 4 | 98 | 60 | 158 | 23,050 | 12,200 | 35,250 | 235 | 203 | 223 |
| Illinois | 33 | 1,475 | 467 | 1,942 | 330,340 | 97,049 | 427,389 | 224 | 208 | 220 |
| Indiana | 74 | 1,418 | 1,676 | 3,094 | 242,230 | 328,058 | 570,288 | 171 | 196 | 184 |
| Iowa | 18 | 266 | 75 | 341 | 44,594 | 11,167 | 55,761 | 168 | 149 | 164 |
| Kansas | 14 | 316 | 66 | 382 | 50,235 | 9,355 | 59,590 | 159 | 142 | 156 |
| Kentucky | 25 | 596 | 197 | 793 | 109,560 | 37,676 | 147,236 | 184 | 191 | 186 |
| Maine | 3 | 129 | 245 | 374 | 39,606 | 89,401 | 129,007 | 307 | 365 | 345 |
| Maryland | 13 | 186 | 80 | 266 | 41,236 | 16,679 | 57,915 | 222 | 208 | 218 |
| Massachusetts | 7 | 116 | 182 | 298 | 32,925 | 59,466 | 92,391 | 284 | 327 | 310 |
| Michigan | 14 | 763 | 462 | 1,225 | 157,089 | 112,009 | 269,098 | 206 | 242 | 220 |
| Minnesota | 7 | 133 | 94 | 227 | 22,159 | 19,483 | 41,642 | 167 | 207 | 183 |
| Missouri | 44 | 1,382 | 406 | 1,788 | 306,207 | 110,921 | 417,128 | 222 | 273 | 233 |
| Montana | 5 | 39 | 13 | 52 | 7,330 | 2,771 | 10,101 | 188 | 213 | 194 |
| Nebraska | 4 | 75 | 17 | 92 | 13,900 | 3,075 | 16,975 | 185 | 181 | 185 |
| New York | 49 | 1,512 | 620 | 2,132 | 317,802 | 114,576 | 432,378 | 210 | 185 | 203 |
| Ohio | 77 | 1,674 | 1,182 | 2,856 | 296,100 | 260,830 | 556,930 | 177 | 221 | 195 |
| Oklahoma | 11 | 266 | 62 | 328 | 55,916 | 13,645 | 69,561 | 210 | 220 | 212 |
| Pennsylvania | 144 | 3,335 | 1,963 | 5,298 | 574,163 | 414,978 | 989,141 | 172 | 211 | 187 |
| Tennessee | 18 | 371 | 193 | 464 | 66,236 | 46,471 | 112,707 | 179 | 241 | 200 |
| Texas | 15 | 438 | 336 | 774 | 73,425 | 70,849 | 144,274 | 168 | 211 | 186 |
| Utah | 9 | 124 | 62 | 186 | 16,814 | 9,524 | 26,338 | 136 | 154 | 142 |
| Vermont | 7 | 67 | 38 | 105 | 13,932 | 9,676 | 23,608 | 208 | 255 | 225 |
| Virginia | 28 | 596 | 369 | 965 | 146,347 | 87,788 | 234,135 | 246 | 238 | 243 |
| Washington | 8 | 70 | 38 | 108 | 13,787 | 9,894 | 23,681 | 197 | 260 | 219 |
| West Virginia | 15 | 803 | 257 | 1,060 | 126,243 | 55,713 | 181,956 | 157 | 217 | 172 |
| Wisconsin | 32 | 314 | 133 | 447 | 60,898 | 23,936 | 84,834 | 194 | 180 | 190 |
| Wyoming | 5 | 99 | ------ | 99 | 21,155 | ------ | 21,155 | 214 | ------ | 214 |
| Not segregated | 24 | 320 | 290 | 610 | 68,454 | 69,909 | 138,363 | 214 | 241 | 227 |
| Total | 763 | 17,970 | 10,263 | 28,233 | 3,415,501 | 2,261,435 | 5,676,936 | 190 | 220 | 201 |

TABLE 19.—*Limestone quarries: Man-hours and number killed and injured, by States, during the year ended Dec. 31, 1931*

| State | Man-hours | | | Number killed | | | Number injured | | | Widows | Orphans |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total | | |
| Alabama | 640,872 | 1,035,983 | 1,676,855 | | | | 101 | 35 | 136 | | |
| Arkansas | 181,557 | 75,506 | 257,063 | | | | 16 | 1 | 17 | | |
| California | 352,227 | 355,814 | 708,041 | 1 | | 1 | 43 | 7 | 50 | | |
| Colorado | 113,141 | 13,520 | 126,661 | | | | 7 | | 7 | | |
| Georgia | 230,500 | 121,940 | 352,440 | | | | 10 | 5 | 15 | | |
| Illinois | 2,133,157 | 746,747 | 2,879,904 | 2 | | 2 | 79 | 33 | 112 | 1 | 5 |
| Indiana | 2,027,016 | 2,449,394 | 4,476,410 | 1 | | 1 | 100 | 74 | 174 | 1 | |
| Iowa | 392,530 | 97,324 | 489,854 | 3 | | 3 | 62 | 12 | 74 | 2 | 6 |
| Kansas | 449,858 | 82,841 | 532,699 | 1 | | 1 | 41 | 7 | 48 | | |
| Kentucky | 1,079,327 | 366,090 | 1,445,417 | | | | 57 | 16 | 73 | | |
| Maine | 356,454 | 715,549 | 1,072,003 | 1 | | 1 | 6 | 12 | 18 | | |
| Maryland | 386,608 | 157,053 | 543,661 | 1 | | 1 | 20 | 9 | 29 | | |
| Massachusetts | 281,875 | 497,423 | 779,298 | | | | 48 | 37 | 85 | | |
| Michigan | 1,291,081 | 914,462 | 2,205,543 | 2 | | 2 | 38 | 39 | 77 | 2 | 3 |
| Minnesota | 184,860 | 157,872 | 342,732 | | | | 37 | 22 | 59 | | |
| Missouri | 2,657,833 | 973,742 | 3,631,575 | 1 | | 1 | 138 | 69 | 207 | | |
| Montana | 58,640 | 22,168 | 80,808 | | | | 6 | | 6 | | |
| Nebraska | 128,000 | 28,560 | 156,560 | | | | 2 | | 2 | | |
| New York | 2,691,195 | 1,012,527 | 3,703,722 | 3 | | 3 | 182 | 57 | 239 | 3 | 2 |
| Ohio | 2,484,821 | 2,285,220 | 4,770,041 | 1 | 1 | 2 | 148 | 116 | 264 | 1 | 1 |
| Oklahoma | 514,145 | 131,594 | 645,739 | | | | 29 | 3 | 32 | | |
| Pennsylvania | 5,050,527 | 3,679,512 | 8,730,039 | 5 | 1 | 6 | 278 | 135 | 413 | 3 | 7 |
| Tennessee | 595,800 | 395,991 | 991,791 | 3 | | 3 | 38 | 7 | 45 | 1 | 3 |
| Texas | 712,695 | 668,649 | 1,381,344 | | | | 36 | 24 | 60 | | |
| Utah | 135,526 | 79,234 | 214,760 | | | | 10 | 3 | 13 | | |
| Vermont | 125,388 | 90,663 | 216,051 | | | | 18 | 6 | 24 | | |
| Virginia | 1,361,493 | 832,431 | 2,193,924 | 1 | 1 | 2 | 56 | 45 | 101 | 1 | 2 |
| Washington | 110,296 | 91,500 | 201,796 | | | | 21 | 5 | 26 | | |
| West Virginia | 1,061,758 | 490,770 | 1,552,528 | 1 | | 1 | 29 | 9 | 38 | 1 | 4 |
| Wisconsin | 506,001 | 236,912 | 742,913 | | | | 87 | 26 | 113 | | |
| Wyoming | 170,430 | | 170,430 | 1 | | 1 | 12 | | 12 | 1 | 1 |
| Not segregated | 627,490 | 659,191 | 1,286,681 | 3 | | 3 | 44 | 26 | 70 | 1 | 4 |
| Total | 29,093,101 | 19,466,182 | 48,559,283 | 31 | 3 | 34 | 1,799 | 840 | 2,639 | 18 | 38 |

TABLE 20.—*Sandstone and bluestone quarries: Men employed and man-shifts by States, during the year ended Dec. 31, 1931*

| State | Number of quarries | Men employed | | | Man-shifts | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total |
| California | 15 | 84 | 44 | 128 | 11,395 | 5,229 | 16,624 | 136 | 119 | 130 |
| Kentucky | 3 | 25 | 15 | 40 | 1,882 | 2,025 | 3,907 | 75 | 135 | 98 |
| New York | 23 | 129 | 74 | 203 | 16,087 | 10,406 | 26,493 | 125 | 141 | 131 |
| Ohio | 14 | 447 | 552 | 999 | 93,179 | 133,310 | 226,489 | 208 | 242 | 227 |
| Pennsylvania | 39 | 666 | 235 | 901 | 91,001 | 36,100 | 127,101 | 137 | 154 | 141 |
| West Virginia | 5 | 56 | 7 | 63 | 10,187 | 1,925 | 12,112 | 182 | 275 | 192 |
| Wisconsin | 8 | 76 | 14 | 90 | 8,664 | 1,176 | 9,840 | 114 | 84 | 109 |
| Not segregated | 26 | 253 | 119 | 372 | 33,407 | 24,113 | 57,520 | 132 | 203 | 155 |
| Total | 133 | 1,736 | 1,060 | 2,796 | 265,802 | 214,284 | 480,086 | 153 | 202 | 172 |

TABLE 21.—*Sandstone and bluestone quarries: Man-hours and number killed and injured, by States, during the year ended Dec. 31, 1931*

| State | Man-hours | | | Number killed | | | Number injured | | | Wid-ows | Or-phans. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | In and about quarry | In out-side works | Total | In and about quar-ry | In out-side works | Total | In and about quar-ry | In out-side works | Total | | |
| California | 92, 591 | 42, 075 | 134, 666 | 2 | | 2 | 16 | 6 | 22 | | |
| Kentucky | 18, 820 | 22, 275 | 41, 095 | | | | | | | | |
| New York | 137, 552 | 89, 692 | 227, 244 | | | | 9 | 9 | 18 | | |
| Ohio | 855, 463 | 1, 180, 878 | 2, 036, 341 | 1 | | 1 | 8 | 21 | 29 | 1 | |
| Pennsylvania | 781, 548 | 320, 107 | 1, 101, 655 | 2 | | 2 | 71 | 3 | 74 | 1 | 1. |
| West Virginia | 89, 758 | 15, 400 | 105, 158 | | | | 9 | | 9 | | |
| Wisconsin | 79, 582 | 11, 654 | 91, 236 | | | | 10 | | 10 | | |
| Not segregated | 298, 753 | 203, 717 | 502, 470 | 1 | | 1 | 29 | 13 | 42 | 1 | |
| Total | 2, 354, 067 | 1, 885, 798 | 4, 239, 865 | 6 | | 6 | 152 | 52 | 204 | 3 | 1 |

## ACCIDENT DATA FOR DIMENSION-STONE AND NONDIMENSION-- STONE QUARRIES

Tables 22 to 25 contain comparative figures for dimension-stone and nondimension-stone quarries. The former had an accident-frequency rate of 47.25 per million man-hours of exposure of "inside" and "outside" employees while the latter had a rate of 36.42. For employees at the quarries proper, exclusive of outside plants such as crushers, cement mills, rock-dressing plants, etc., the rate for fatalities and injuries was 62.73 for dimension-stone and 60.38 for nondimension-stone operations. Corresponding rates for men employed at the outside plants were 35.47 for dimension-stone and 20.60 for non-dimension-stone quarries. The causes of fatalities and injuries and the number of accidents attributed to each important cause are shown in table 24.

Comparative figures for the two classes of quarries, classified according to the kind of stone produced, are given in tables 22 to 24, while table 25 contains comparative figures for different States.

TABLE 22.—*Dimension-stone and nondimension-stone quarries: Men employed and man-shifts, by kind of quarry, during the year ended Dec. 31, 1931*

| Kind of quarry | Men employed | | | Man-shifts | | | Average days active | | |
|---|---|---|---|---|---|---|---|---|---|
| | At quarry | At outside works | Total | At quarry | At outside works | Total | At quarry | At outside works | Total |
| **Dimension stone:** | | | | | | | | | |
| Granite_____ | 2,604 | 2,969 | 5,573 | 581,122 | 658,402 | 1,239,524 | 223 | 222 | 222 |
| Limestone_____ | 1,436 | 1,826 | 3,262 | 264,928 | 385,036 | 649,964 | 184 | 211 | 199 |
| Marble_____ | 1,692 | 2,826 | 4,518 | 429,535 | 830,603 | 1,260,138 | 254 | 294 | 279 |
| Sandstone and blue-stone_____ | 757 | 786 | 1,543 | 145,536 | 180,808 | 326,344 | 192 | 230 | 211 |
| Slate_____ | 1,211 | 1,058 | 2,269 | 233,127 | 195,996 | 429,123 | 193 | 185 | 189 |
| Trap rock_____ | 64 | 64 | 128 | 10,439 | 9,328 | 19,767 | 163 | 146 | 154 |
| Total_____ | 7,764 | 9,529 | 17,293 | 1,664,687 | 2,260,173 | 3,924,860 | 214 | 237 | 227 |
| **Nondimension stone:** | | | | | | | | | |
| Cement rock_____ | 3,645 | 14,811 | 18,456 | 814,177 | 4,142,723 | 4,956,900 | 223 | 280 | 269 |
| Granite_____ | 1,038 | 320 | 1,358 | 193,391 | 66,435 | 259,826 | 186 | 208 | 191 |
| Limestone_____ | 14,513 | 7,657 | 22,170 | 2,743,361 | 1,682,255 | 4,425,616 | 189 | 220 | 200 |
| Marble_____ | 41 | 23 | 64 | 9,366 | 5,727 | 15,093 | 228 | 249 | 236 |
| Sandstone and blue-stone_____ | 797 | 211 | 1,008 | 90,363 | 23,747 | 114,110 | 113 | 113 | 113 |
| Slate_____ | 9 | 3 | 12 | 1,575 | 900 | 2,475 | 175 | 300 | 206 |
| Trap rock_____ | 1,620 | 919 | 2,539 | 292,950 | 161,254 | 454,204 | 181 | 175 | 179 |
| Total_____ | 21,663 | 23,944 | 45,607 | 4,145,183 | 6,083,041 | 10,228,224 | 191 | 254 | 224 |
| **All other and not stated:** | | | | | | | | | |
| Granite_____ | 1,094 | 1,414 | 2,508 | 233,416 | 344,513 | 577,929 | 213 | 244 | 230 |
| Limestone_____ | 2,021 | 780 | 2,801 | 407,212 | 194,144 | 601,356 | 201 | 249 | 215 |
| Marble_____ | 23 | 49 | 72 | 5,132 | 11,872 | 17,004 | 223 | 242 | 236 |
| Sandstone and blue-stone_____ | 182 | 63 | 245 | 29,903 | 9,729 | 39,632 | 164 | 154 | 162 |
| Slate_____ | 48 | 32 | 80 | 12,040 | 9,516 | 21,556 | 251 | 297 | 269 |
| Trap rock_____ | 426 | 168 | 594 | 80,857 | 35,085 | 115,942 | 190 | 209 | 195 |
| Total_____ | 3,794 | 2,506 | 6,300 | 768,560 | 604,859 | 1,373,419 | 203 | 241 | 218 |
| Grand total_____ | 33,221 | 35,979 | 69,200 | 6,578,430 | 8,948,073 | 15,526,503 | 198 | 249 | 224 |

TABLE 23.—Dimension-stone and nondimension-stone quarries: Accident rates per million man-hours during the year ended Dec. 31, 1931

| Kind of quarry | Man-hours At quarry | Man-hours At outside works | Man-hours Total | Killed At quarry Number | Killed At quarry Per million man-hours worked | Killed At outside works Number | Killed At outside works Per million man-hours worked | Killed Total Number | Killed Total Per million man-hours worked | Injured At quarry Number | Injured At quarry Per million man-hours worked | Injured At outside works Number | Injured At outside works Per million man-hours worked | Injured Total Number | Injured Total Per million man-hours worked |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Dimension stone:** | | | | | | | | | | | | | | | |
| Granite | 4,658,039 | 5,043,374 | 9,701,413 | 3 | 0.64 | | | 3 | 0.31 | 333 | 71.49 | 273 | 54.13 | 606 | 62.47 |
| Limestone | 2,282,452 | 3,017,558 | 5,300,010 | 2 | .88 | | | 2 | .38 | 181 | 79.30 | 98 | 33.48 | 279 | 52.64 |
| Marble | 3,827,671 | 7,228,333 | 11,056,004 | 1 | .26 | | | 1 | .09 | 149 | 38.93 | 184 | 25.46 | 333 | 30.12 |
| Sandstone and bluestone | 1,299,091 | 1,586,583 | 2,885,674 | 1 | .77 | | | 1 | .35 | 58 | 44.65 | 35 | 22.06 | 93 | 32.23 |
| Slate | 2,026,404 | 1,673,842 | 3,700,246 | 1 | .49 | | | 1 | .27 | 156 | 76.98 | 63 | 37.64 | 219 | 59.19 |
| Trap rock | 93,279 | 85,876 | 179,155 | | | | | | | 5 | 53.60 | 8 | 93.16 | 13 | 72.56 |
| Total | 14,186,936 | 18,635,566 | 32,822,502 | 8 | .56 | | | 8 | .24 | 882 | 62.17 | 661 | 35.47 | 1,543 | 47.01 |
| **Nondimension stone:** | | | | | | | | | | | | | | | |
| Cement rock | 7,113,070 | 36,835,423 | 43,948,493 | 6 | .84 | 4 | 0.11 | 10 | .23 | 238 | 33.46 | 299 | 8.12 | 537 | 12.22 |
| Granite | 1,685,739 | 561,112 | 2,246,851 | 1 | .59 | 1 | 1.78 | 2 | .89 | 163 | 96.69 | 55 | 98.02 | 218 | 97.02 |
| Limestone | 23,312,733 | 14,846,059 | 38,158,792 | 26 | 1.12 | 3 | .20 | 29 | .76 | 1,452 | 62.28 | 648 | 43.65 | 2,100 | 55.03 |
| Marble | 81,528 | 48,216 | 129,744 | | | | | | | 4 | 49.06 | 3 | 62.22 | 7 | 53.95 |
| Sandstone and bluestone | 796,934 | 211,988 | 1,008,922 | 3 | 3.76 | | | 3 | 2.97 | 51 | 64.00 | 17 | 80.19 | 68 | 67.40 |
| Slate | 12,600 | 7,200 | 19,800 | | | | | | | | | | | | |
| Trap rock | 2,555,196 | 1,324,683 | 3,879,879 | 1 | .39 | 1 | .75 | 2 | .52 | 202 | 79.05 | 78 | 58.88 | 280 | 72.17 |
| Total | 35,557,800 | 53,834,681 | 89,392,481 | 37 | 1.04 | 9 | .17 | 46 | .51 | 2,110 | 59.34 | 1,100 | 20.43 | 3,210 | 35.91 |
| **All other and not stated:** | | | | | | | | | | | | | | | |
| Granite | 1,923,342 | 2,806,858 | 4,730,200 | | | 1 | .36 | 1 | .21 | 122 | 63.43 | 164 | 58.43 | 286 | 60.46 |
| Limestone | 3,497,916 | 1,602,565 | 5,100,481 | 3 | .86 | | | 3 | .59 | 166 | 47.46 | 94 | 58.66 | 260 | 50.98 |
| Marble | 44,688 | 106,248 | 150,936 | | | | | | | 1 | 22.38 | 3 | 28.24 | 4 | 28.50 |
| Sandstone and bluestone | 258,042 | 87,227 | 345,269 | 2 | 7.75 | | | 2 | 5.79 | 43 | 166.64 | | | 43 | 124.54 |
| Slate | 108,360 | 85,644 | 194,004 | | | | | | | 9 | 83.06 | 2 | 23.35 | 11 | 56.70 |
| Trap rock | 703,404 | 310,847 | 1,014,251 | | | 1 | 3.22 | 1 | .99 | 57 | 81.03 | 13 | 41.82 | 70 | 69.02 |
| Total | 6,535,752 | 4,999,389 | 11,535,141 | 5 | .77 | 2 | .40 | 7 | .61 | 398 | 60.90 | 276 | 55.21 | 674 | 58.43 |
| Grand total | 56,280,488 | 77,469,636 | 133,750,124 | 50 | .89 | 11 | .14 | 61 | .46 | 3,390 | 60.23 | 2,037 | 26.29 | 5,427 | 40.58 |

TABLE 24.—*Dimension-stone and nondimension-stone quarries: Fatalities and injuries, by causes, during the year ended Dec. 31, 1931* [1]

| Kind of quarry | Open quarry | | | | | | | | | | | | | | | | At outside works | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1. Falls or slides of rock, or overburden | 2. Handling materials | 3. Hand tools | 4. Explosives | 5. Haulage | 6. Falls of persons | 7. Falling objects (other than 1 and 2) | 8. Flying objects | 9. Electricity | 10. Drilling and channeling (by machine or hand) | 11. Machinery | 12. Stepping on nails, etc. | 13. Boiler and air-tank explosions | 14. Burns | 15. Other causes | Total | 16. Haulage | 17. Machinery | 18. Hand tools | 19. Stepping on nails, etc. | 20. Electricity | 21. Falls of persons | 22. Falling objects (rocks, timbers, etc.) | 23. Flying objects | 24. Handling materials | 25. Burns | 26. Other causes | Total |
| **DIMENSION STONE** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Killed: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|   Granite | 1 | | | | | | | | | | 1 | | | | 1 | 3 | | | | | | | | | | | | |
|   Limestone | | | | 1 | | | | | | | 1 | | | | | 2 | | | | | | | | | | | | |
|   Marble | | 1 | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
|   Sandstone and bluestone | 1 | | | | | | | | | | | | | | | 1 | | | | | | | | | | | | |
|   Slate | | | | | | | 1 | | | | | | | | | 1 | | | | | | | | | | | | |
|     Total | 2 | 1 | | 1 | | | 1 | | | | 2 | | | | 1 | 8 | | | | | | | | | | | | |
| Injured: | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|   Granite | 22 | 67 | 17 | 5 | 13 | 31 | 17 | 63 | 2 | 41 | 27 | 1 | 1 | 1 | 25 | 333 | 9 | 20 | 17 | 2 | 1 | 6 | 10 | 108 | 56 | | 41 | 273 |
|   Limestone | 8 | 33 | 6 | | 6 | 18 | 8 | 27 | 1 | 15 | 24 | 4 | | 8 | 23 | 181 | 2 | 14 | 2 | 2 | | 6 | 30 | 11 | 27 | | 4 | 98 |
|   Marble | 2 | 29 | 11 | 4 | 4 | 8 | 3 | 14 | | 14 | 4 | 2 | | 1 | 12 | 102 | 5 | 24 | 10 | | | 24 | 25 | 19 | 62 | 3 | 15 | 184 |
|   Sandstone and bluestone | 11 | 13 | 1 | | 2 | | 4 | 8 | | 2 | 6 | 1 | | 1 | 9 | 58 | 1 | 2 | 1 | 1 | 4 | 1 | 2 | 6 | 8 | | 14 | 35 |
|   Slate | | 77 | 8 | | 6 | 13 | 3 | 3 | | 2 | 5 | 1 | | 2 | 9 | 145 | 5 | 5 | 3 | | 2 | 8 | 4 | 2 | 28 | | 3 | 63 |
|   Trap rock | | | | | | 3 | | | | | 1 | 1 | | | | 5 | | 1 | 1 | | | | | 2 | 1 | | 1 | 8 |
|     Total | 43 | 219 | 43 | 9 | 31 | 73 | 35 | 115 | 3 | 74 | 67 | 10 | 1 | 13 | 78 | 824 | 22 | 66 | 34 | 5 | 7 | 45 | 71 | 148 | 182 | 3 | 78 | 661 |

| NONDIMENSION STONE | ... | Total |
|---|---|---|
| **Killed:** | | |
| Cement rock | | 4 |
| Granite | | 1 |
| Limestone | | 3 |
| Marble | | |
| Sandstone and bluestone | | 1 |
| Trap rock | | |
| **Total** | | 9 |
| **Injured:** | | |
| Cement rock | | 299 |
| Granite | | 55 |
| Limestone | | 648 |
| Marble | | 3 |
| Sandstone and bluestone | | 17 |
| Trap rock | | 78 |
| **Total** | | 1,100 |
| **ALL OTHER** | | |
| **Killed:** | | |
| Granite | | 1 |
| Limestone | | |
| Sandstone and bluestone | | 1 |
| Trap rock | | |
| **Total** | | 2 |
| **Injured:** | | |
| Granite | | 164 |
| Limestone | | 94 |
| Marble | | 3 |
| Sandstone and bluestone | | |
| Slate | | 2 |
| Trap rock | | 13 |
| **Total** | | 276 |

[1] No accidents occurred in classes of quarries not listed.

TABLE 24.—*Dimension-stone and nondimension-stone quarries: Fatalities and injuries, by causes, during the year ended Dec. 31, 1931*—Contd.

| Kind of quarry | Underground quarry |||||||||||||||| | Shaft or slope ||||||| | Grand total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fall of rock from roof or wall (27) | Rock while loading at working face or chute (28) | Hand tools (29) | Explosives (30) | Haulage (31) | Falling down chute, winze, raise, or slope (32) | Run of rock from chute or pocket (33) | Drilling (34) | Electricity (35) | Machinery (other than locomotives or drills) (36) | Mine fires (37) | Suffocation from natural gases (38) | Inrush of water (39) | Stepping on nails, etc. (40) | Handling materials (other than rock) (41) | Other causes (42) | Total | Falling down shaft or slope (43) | Objects falling down shaft or slope (44) | Breaking of cables (45) | Overwinding (46) | Cage, skip, or bucket (47) | Other causes (48) | Total | |
| **DIMENSION STONE** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Killed: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Slate | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Total | | | | | | | | | | | | | | | | | | | | | | | | | 8 |
| Injured: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 606 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | | 279 |
| Marble | 1 | 3 | 5 | 1 | 2 | | | 6 | 1 | 3 | | | | 3 | 6 | 16 | 47 | | | | | | | | 333 |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 93 |
| Slate | | 7 | | | | | | | | 1 | | | | | 1 | 2 | 11 | | | | | | | | 219 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| Total | 1 | 10 | 5 | 1 | 2 | | | 6 | 1 | 4 | | | | 3 | 7 | 18 | 58 | | | | | | | | 1,543 |

| | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NONDIMENSION STONE | | | | | | | | | | | | | | | | | | | | | | | | | |
| Killed: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 1 | | | | | | | | | 1 | | | | | | | 2 | | | | | | | | 10 |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| Limestone | 1 | | | | | | | | | | | | | | | | 1 | | | | | | | | 29 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | | |
| Sandstone and bluestone | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 2 |
| Total | 2 | | | | | | | | | 1 | | | | | | | 3 | | | | | | | | 46 |
| Injured: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Cement rock | 23 | 21 | 7 | 4 | 6 | 8 | 25 | 18 | 2 | 1 | | | | 2 | 6 | 6 | 129 | | | | | | | | 537 |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 218 |
| Limestone | 8 | 16 | 2 | | 6 | 4 | 1 | 3 | | 1 | | | | 1 | 2 | 6 | 50 | | 2 | | | | | 2 | 2, 100 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | | 7 |
| Sandstone and bluestone | | | | | 3 | | | 1 | | | | | | | | | 4 | | | | | | | | 68 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 280 |
| Total | 31 | 37 | 9 | 4 | 15 | 12 | 26 | 22 | 2 | 2 | | | | 3 | 8 | 12 | 183 | | 2 | | | | | 2 | 3, 210 |
| ALL OTHER | | | | | | | | | | | | | | | | | | | | | | | | | |
| Killed: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Limestone | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| Sandstone and bluestone | | | | 1 | | | | | | 1 | | | | | | | 2 | | | | | | | | 2 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 1 |
| Total | | | | 1 | | | | | | 1 | | | | | | | 2 | | | | | | | | 7 |
| Injured: | | | | | | | | | | | | | | | | | | | | | | | | | |
| Granite | | | | | | | | | | | | | | | | | | | | | | | | | 286 |
| Limestone | 1 | | | | | | | | | | | | | | | 1 | 2 | | | | | 2 | | 2 | 260 |
| Marble | | | | | | | | | | | | | | | | | | | | | | | | | 4 |
| Sandstone and bluestone | 3 | | | 1 | | | | | | | | | | | 3 | | 7 | | | | | | | | 43 |
| Slate | 3 | 1 | | | | | | | | | | | | | | | 5 | | | | | | | | 11 |
| Trap rock | | | | | | | | | | | | | | | | | | | | | | | | | 70 |
| Total | 7 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 1 | 14 | 0 | 0 | 0 | 0 | 2 | 0 | 2 | 674 |

TABLE 25.—*Dimension-stone and nondimension-stone quarries: Men employed, man-shifts, man-hours, number killed and injured, and rates per million man-hours, inside the quarries, during the year ended Dec. 31, 1931*

| State | Dimension stone | | | | | | | Nondimension stone | | | | | | | All other and not stated | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Men employed | Man-shifts | Man-hours | Killed | Injured | Rate Killed | Rate Injured | Men employed | Man-shifts | Man-hours | Killed | Injured | Rate Killed | Rate Injured | Men employed | Man-shifts | Man-hours | Killed | Injured | Rate Killed | Rate Injured |
| Alabama | 262 | 46,460 | 438,090 | | 74 | | 168.92 | 587 | 87,009 | 794,484 | | 41 | | 51.61 | 49 | 1,764 | 17,640 | | 3 | | |
| Arizona | 25 | 6,250 | 62,500 | | | | | 33 | 4,990 | 39,920 | | 7 | | | 7 | 2,184 | 17,472 | | | | |
| Arkansas | 220 | 46,878 | 311,053 | | 40 | | 128.60 | 192 | 25,319 | 232,881 | 1 | 16 | 4.29 | 68.70 | | | | | | | |
| California | | | | | | | | 939 | 194,674 | 1,603,777 | 4 | 240 | 2.49 | 149.65 | 202 | 39,883 | 320,814 | | 30 | | 93.51 |
| Colorado | 58 | 13,210 | 112,419 | | 17 | | | 97 | 16,297 | 133,925 | | 3 | | 22.40 | 27 | 3,825 | 30,600 | | 1 | | |
| Connecticut | 108 | 25,387 | 220,221 | | 16 | | 72.65 | 232 | 45,981 | 386,958 | | 8 | | 20.67 | 103 | 29,819 | 262,135 | | 17 | | 64.85 |
| Florida | 4 | 1,200 | 12,000 | | 2 | | | 40 | 7,100 | 71,000 | | | | | | | | | | | |
| Georgia | 322 | 79,336 | 600,095 | | 26 | | 37.68 | 260 | 57,252 | 567,528 | 1 | 32 | 1.76 | 56.38 | 220 | 40,645 | 346,200 | | 4 | | 11.55 |
| Idaho | | | | | | | | 13 | 2,808 | 22,824 | | 1 | | | | | | | | | |
| Illinois | 57 | 8,446 | 81,710 | | 6 | | | 1,638 | 376,192 | 2,501,838 | 2 | 77 | .80 | 30.78 | 30 | 4,698 | 32,886 | | 5 | | |
| Indiana | 866 | 168,256 | 1,346,676 | 1 | 67 | 0.74 | 49.75 | 533 | 77,177 | 698,846 | | 33 | | 47.22 | 174 | 22,473 | 184,940 | 1 | 5 | | 26.75 |
| Iowa | 11 | 2,309 | 19,304 | | | | | 317 | 59,561 | 544,098 | 2 | 49 | 3.68 | 90.06 | 62 | 9,496 | 80,918 | | 20 | | |
| Kansas | 20 | 2,050 | 19,000 | | | | | 385 | 66,693 | 576,358 | | 35 | | 60.73 | 54 | 6,556 | 55,104 | | 8 | | |
| Kentucky | 443 | 90,809 | 727,576 | | 79 | | 108.58 | 558 | 104,796 | 1,010,915 | | 61 | | 60.34 | 86 | 16,722 | 165,240 | | 1 | | 6.05 |
| Maine | 70 | 15,128 | 149,868 | 1 | 19 | 6.67 | 126.78 | 69 | 21,006 | 195,174 | 1 | 2 | 5.12 | 10.25 | 182 | 50,184 | 441,072 | | 13 | | 29.47 |
| Maryland | 337 | 66,219 | 529,752 | 1 | 57 | 1.89 | 107.60 | 362 | 75,914 | 700,864 | 1 | 50 | 1.43 | 71.34 | 74 | 12,391 | 111,720 | | | | |
| Massachusetts | 26 | 4,532 | 40,288 | | 11 | | | 454 | 94,263 | 822,183 | | 130 | | 158.12 | 154 | 36,430 | 298,720 | | 20 | | 66.95 |
| Michigan | 291 | 62,011 | 511,476 | | 67 | | 130.99 | 767 | 154,265 | 1,265,870 | 1 | 33 | .79 | 26.07 | 53 | 14,210 | 119,680 | | | | |
| Minnesota | 141 | 37,004 | 356,590 | | 13 | | 36.46 | 47 | 7,544 | 61,640 | | 21 | | | 85 | 10,635 | 83,280 | | | | |
| Missouri | 10 | 798 | 6,384 | | 1 | | | 1,296 | 271,338 | 2,242,373 | 1 | 114 | .45 | 50.84 | 246 | 60,010 | 583,280 | 1 | 24 | 1.71 | 41.15 |
| Montana | | | | | | | | 40 | 7,419 | 59,352 | | 6 | | | 4 | 244 | 1,952 | | | | |
| Nebraska | | | | | | | | 125 | 28,689 | 258,838 | | 3 | | 11.59 | | | | | | | |
| New Hampshire | 102 | 20,706 | 165,648 | | 8 | | 48.30 | 97 | 1,386 | 11,088 | | | | | 68 | 14,044 | 112,352 | | 7 | | |
| New Jersey | 35 | 5,241 | 47,946 | | 1 | | | 401 | 88,185 | 768,869 | | 37 | | 48.12 | 206 | 30,289 | 260,547 | | 17 | | 65.25 |
| New York | 185 | 27,161 | 237,395 | | 15 | | 63.19 | 1,813 | 379,561 | 3,231,385 | 3 | 193 | .93 | 59.73 | 105 | 21,014 | 192,066 | | 5 | | 26.03 |
| North Carolina | 9 | 990 | 9,900 | | | | | 339 | 66,835 | 560,450 | | 24 | | 42.82 | 230 | 60,250 | 492,500 | 1 | 31 | | 62.94 |
| Ohio | 363 | 80,115 | 728,615 | 1 | 8 | 1.37 | 10.98 | 1,327 | 218,599 | 1,914,871 | | 144 | | 75.20 | 647 | 126,279 | 1,011,636 | 1 | 9 | .99 | 8.90 |
| Oklahoma | 13 | 2,200 | 17,600 | | | | | 268 | 58,836 | 526,471 | | 29 | | 55.08 | | | | | | | |
| Oregon | 7 | 1,155 | 9,240 | | | | | 71 | 10,117 | 80,936 | | 4 | | | 59 | 10,149 | 92,226 | | | | |
| Pennsylvania | 927 | 182,670 | 1,529,889 | | 107 | | 69.94 | 4,509 | 779,129 | 6,885,593 | 9 | 321 | 1.31 | 46.62 | 312 | 66,990 | 562,802 | 2 | 59 | 3.55 | 104.83 |
| Rhode Island | 38 | 10,648 | 85,184 | | 3 | | | 20 | 4,590 | 41,060 | | | | | 4 | 600 | 4,800 | | | | |
| South Carolina | 4 | 360 | 3,600 | | | | | 90 | 22,140 | 221,400 | | 45 | | 203.25 | 3 | 300 | 2,400 | | | | |
| South Dakota | 40 | 9,800 | 78,400 | | 4 | | | 78 | 11,654 | 107,256 | | | | | | | | | | | |
| Tennessee | 801 | 191,130 | 1,796,866 | | 43 | | 23.93 | 444 | 88,024 | 762,168 | 3 | 39 | 3.94 | 51.17 | 8 | 984 | 8,856 | | | | |
| Texas | 126 | 26,735 | 259,800 | | 13 | | 50.04 | 511 | 83,532 | 848,737 | | 35 | | 41.24 | | | | | | | |
| Utah | 20 | 750 | 6,000 | | | | | 122 | 17,384 | 140,086 | | 11 | | 78.52 | | | | | | | |

| | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Vermont | 1,372 | 355,874 | 2,897,477 | 2 | 117 | .69 | 40.38 | 49 | 8,532 | 76,788 | 1 | 6 | — | — | 22 | 5,937 | 53,421 | 12 | — | — |
| Virginia | 209 | 31,945 | 318,596 | — | 30 | — | 94.16 | 990 | 225,957 | 2,105,450 | — | 74 | .47 | 35.15 | 30 | 5,550 | 44,400 | 7 | — | — |
| Washington | 58 | 6,819 | 54,552 | — | 1 | — | — | 208 | 41,482 | 331,856 | 2 | 34 | 1.53 | 102.45 | 10 | 1,937 | 15,520 | 1 | — | — |
| West Virginia | 43 | 7,812 | 70,308 | — | 8 | — | 119.19 | 933 | 156,177 | 1,309,028 | — | 30 | — | 22.92 | 232 | 49,385 | 412,693 | 71 | — | 172.04 |
| Wisconsin | 141 | 28,293 | 234,918 | — | 28 | — | — | 272 | 39,925 | 338,718 | — | 50 | 5.87 | 147.62 | — | — | — | — | — | — |
| Wyoming | — | — | — | — | — | — | — | 99 | 21,155 | 170,430 | 1 | 12 | 9.00 | 70.41 | — | — | — | — | — | — |
| Not segregated [1] | — | — | — | — | — | — | — | 128 | 35,696 | 333,514 | 3 | 19 | — | 56.97 | 33 | 9,933 | 91,880 | 10 | — | — |
| Total | 7,764 | 1,664,687 | 14,186,936 | 8 | 882 | .56 | 62.17 | 21,663 | 4,145,183 | 35,557,800 | 37 | 2,110 | 1.04 | 59.34 | 3,794 | 768,560 | 6,535,752 | 398 | 5 | 60.90 | .77 |

[1] Includes Delaware, Louisiana, Nevada, and New Mexico.

## NONFATAL-INJURY RATES FROM PRINCIPAL CAUSES OF ACCIDENTS INSIDE OPEN QUARRIES IN DIFFERENT STATES

The average rate for nonfatal injuries to men employed inside all ·open quarries in the United States in 1931 was 60.28 per million man-hours of exposure. Among 10 States in which 1,000 or more men were employed inside the open quarries during the year, 9 reported .accident rates that were lower and therefore better than the general average for the whole country, and 1 reported a rate higher than the general average. This situation indicates that the States in which ·quarrying is a large and well-organized industry are those in which :safety and accident prevention have made the most progress.

Of the 10 States mentioned, which are shown in table 26, Illinois had the best safety record; that is, the lowest accident rate. The accident rate for Illinois was only 32.46 per million man-hours of ·exposure.

Handling materials is the chief cause of accidents at quarries in the United States. Tennessee had the best safety record from this cause ·of the 10 largest quarrying States. Flying objects was the second leading cause of quarry accidents, and Illinois had the best record from this cause. New York won first place in the prevention of falls ·or slides of rock or overburden; Indiana had the lowest accident rate from haulage accidents; Virginia reported the lowest rate for falls of persons; Tennessee had the best record as regards accidents due to machinery; and Virginia followed by Illinois established the lowest accident rates for drilling.

·TABLE 26.—*Nonfatal injury rates per million man-hours worked inside open quarries, during the year ended Dec. 31, 1931, in principal quarrying States, by chief causes of accidents*

| Cause | Pennsylvania | Ohio | New York | Illinois | Indiana | Missouri | Virginia | Tennessee | California | Vermont | United States |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Handling materials___ | 23. 61 | 6. 51 | 15. 92 | 7. 69 | 8. 96 | 15. 44 | 13. 61 | 5. 44 | 25. 41 | 11. 66 | 17. 91 |
| Flying objects_____ | 9. 09 | 4. 25 | 3. 02 | 2. 56 | 6. 72 | 4. 78 | 3. 71 | 8. 38 | 8. 29 | 6. 80 | 8. 01 |
| Falls or slides of rock or overburden_____ | 5. 55 | 3. 40 | 1. 92 | 3. 84 | 5. 38 | 5. 52 | 5. 36 | 2. 51 | 14. 92 | 2. 43 | 5. 80 |
| Haulage_____ | 2. 78 | 5. 66 | 6. 86 | 3. 42 | 2. 24 | 6. 62 | 5. 36 | 3. 35 | 8. 84 | 3. 89 | 4. 64 |
| Falls of persons_____ | 2. 90 | 5. 66 | 2. 74 | 2. 99 | 4. 03 | 1. 84 | 1. 24 | 1. 26 | 14. 92 | 7. 77 | 4. 18 |
| Machinery_____ | 1. 77 | 5. 10 | 6. 86 | 2. 56 | 2. 69 | 2. 94 | 3. 30 | _____ | 7. 18 | 1. 94 | 3. 95 |
| Drilling_____ | 1. 64 | 4. 53 | 3. 84 | 1. 28 | 2. 24 | 2. 94 | 1. 24 | 4. 19 | 9. 94 | 3. 89 | 3. 87 |
| Total_____ | 58. 32 | 44. 17 | 57. 91 | 32. 46 | 47. 03 | 46. 70 | 42. 90 | 33. 50 | 104. 42 | 45. 67 | 60. 28 |

## ACCIDENTS AT CEMENT MILLS

The cement industry has been notable for a number of years for the exceptionally low accident rates established at its mills. The accident rate for cement mills in 1931, excluding operations at quarries, was 6.92 per million man-hours of exposure. This rate resulted from 22,980,603 man-hours of work by 9,281 cement-mill employees. Similar rates for certain States are given in table 27.

TABLE 27.—*Selected plants: Accident rates, men employed, etc., at cement mills (including crushers) during the year ended Dec. 31, 1931*

| State | Men employed | Man-shift | Average days active | Man-hours | Killed | Permanent total | Permanent partial | Temporary | Total nonfatal | Killed per million man-hours | Injured per million man-hours |
|---|---|---|---|---|---|---|---|---|---|---|---|
| California | 725 | 233, 263 | 322 | 1, 903, 711 | | | 1 | 31 | 32 | | 16. 81 |
| Illinois | 904 | 245, 788 | 272 | . 2, 104, 800 | | | 1 | 9 | 10 | | 4. 75 |
| Kansas | 341 | 83, 135 | 244 | 748, 596 | | | 2 | | 2 | | 2. 67 |
| New York | 562 | 173, 185 | 308 | 1, 386, 720 | | | | 4 | 4 | | 2. 88 |
| Ohio | 699 | 202, 385 | 290 | 1, 647, 996 | | | 1 | 2 | 3 | | 1. 82 |
| Pennsylvania | 2, 231 | 604, 014 | 271 | 5, 329, 021 | | | | 23 | 23 | | 4. 32 |
| Not segregated | 3, 819 | 1, 034, 479 | 271 | 9, 859, 759 | 2 | | 3 | 80 | 83 | 0. 20 | 8. 42 |
| Total | 9, 281 | 2, 576, 249 | 278 | 22, 980, 603 | 2 | | 8 | 149 | 157 | . 09 | 6. 83 |

| Severity of injury | Haulage | Machinery | Hand tools | Stepping on nails, etc. | Electricity | Falls of persons | Falling objects, (rocks, timbers, etc.) | Flying objects | Handling materials | Burns | Other causes | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Killed | | | | | | 1 | | | | 1 | | 2 |
| Permanent total | | | | | | | | | | | | 0 |
| Permanent partial | | 5 | | | | | 1 | 1 | | | 1 | 8 |
| Temporary | 9 | 23 | 4 | 2 | 7 | 15 | 17 | 12 | 17 | 20 | 23 | 149 |
| Total, nonfatal | 9 | 28 | 4 | 2 | 7 | 15 | 17 | 13 | 18 | 20 | 24 | 157 |

## OUTSTANDING SAFETY RECORDS OF CERTAIN COUNTIES

Sixteen States had 1 or more counties where 500 or more men were employed in the quarrying industry and where at least 3 companies were in operation in 1931. Table 28 shows the counties in this class that established the lowest accident-frequency rates in their respective States.

Other counties also had as many as 500 employees of quarrying companies but are not included in table 28 because less than three companies were in operation, therefore accident figures cannot be published without the possibility of revealing figures of individual companies, a practice inconsistent with the policy of the United States Bureau of Mines.

Among counties having 500 or more men employed by quarrying companies and for which separate figures may be published, the lowest accident rate as shown in table 28, was that for Armstrong County, Pa. The combined accident rate covering all quarries and outside plants in Armstrong County was only 5.80 per million man-hours of exposure to occupational hazards. Second place was occupied by La Salle County, Ill., whose accident rate was 8.84, while Jefferson County, Ala., whose rate was 9.12, occupied third place. How favorable these rates are is apparent when they are compared with the average accident rate of 41.04 for all quarries and outside plants in the United States. Corresponding rates for other counties are shown in table 28.

TABLE 28.—*Counties having 500 or more employees in quarries (including outside works) with lowest accident rate per million man-hours in 1931* [1]

[Rate includes those killed and injured]

| State | County | Rate per million man-hours | Total men employed | State | County | Rate per million man-hours | Total men employed |
|---|---|---|---|---|---|---|---|
| Alabama | Jefferson | 9.12 | 905 | Minnesota | Stearns | 63.45 | 745 |
| California | San Bernardino | 28.92 | 519 | Missouri | Cape Girardeau | 18.64 | 580 |
| Georgia | De Kalb | 18.91 | 630 | New York | Onondago | 54.74 | 542 |
| Illinois | La Salle | 8.84 | 957 | Ohio | Sandusky | 44.81 | 597 |
| Indiana | Lawrence | 21.20 | 1,678 | Pennsylvania | Armstrong | 5.80 | 565 |
| Maine | Knox | 22.12 | 969 | Tennessee | Knox | 25.43 | 1,280 |
| Massachusetts | Middlesex | 47.55 | 694 | Vermont | Rutland | 29.14 | 2,045 |
| Michigan | Alpena | 22.71 | 792 | West Virginia | Berkeley | 23.76 | 759 |

[1] Counties in which less than 3 operators reported are not shown.

## COMPARATIVE SEVERITY OF INJURIES FROM QUARRY ACCIDENTS

Table 29 contains comparative figures covering accidents at quarries and outside plants during 1931 and previous years. As accident rates per million man-hours of exposure are not available for years prior to 1931, the rates in table 29 are shown per thousand 300-day employees. Average figures for the 5 years 1922 to 1926, inclusive, reveal an accident rate for the quarry industry of 172.4 per thousand 300-day workers, and similar figures for the 5-year period 1927 to 1931, inclusive, show that the rate had been lowered to 130.9, a reduction of 24 percent.

Figures for the 5 years 1927 to 1931 show that of 47,227 lost-time accidents reported to the United States Bureau of Mines during that period, 546 resulted in death and 46,681 in lost-time injuries. Thus, for every fatality there was an average of 85½ nonfatal injuries. If 100 percent represents the total number of accidents, the figures indicate that 1.16 percent of the accidents were fatal, 0.11 percent resulted in permanent total disability, 3.05 percent caused permanent partial disability, and 95.68 percent resulted in temporary disability lasting more than the remainder of the day on which the accident occurred.

TABLE 29.—*All quarries: Number of fatalities and injuries, and fatality and injury rates, per thousand 300-day workers, classified by severity of injury, 1922–31*

NUMBER OF QUARRY ACCIDENTS

| Severity of injury | Total, 1922–26 | 1927 | 1928 | 1929 | 1930 | 1931 | Total, 1927–31 |
|---|---|---|---|---|---|---|---|
| Fatal | 716 | 135 | 119 | 126 | 105 | 61 | 546 |
| Permanent total [1] | 82 | 7 | 13 | 5 | 12 | 16 | 53 |
| Permanent partial [2] | 2,111 | 358 | 348 | 295 | 253 | 189 | 1,443 |
| Temporary [3] | 66,779 | 13,094 | 10,207 | 9,510 | 7,152 | 5,222 | 45,185 |
| Total | 69,688 | 13,594 | 10,687 | 9,936 | 7,522 | 5,488 | 47,227 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of 1 foot, leg, hand or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Disability for more than remainder of day of accident.

TABLE 29.—*All quarries: Number of fatalities and injuries, and fatality and injury rates, per thousand 300-day workers, classified by severity of injury, 1922–31*—Continued

### RATES PER THOUSAND 300-DAY WORKERS

| Severity of injury | Total, 1922–26 | 1927 | 1928 | 1929 | 1930 | 1931 | Total 1927–31 |
|---|---|---|---|---|---|---|---|
| Fatal | 1.771 | 1.634 | 1.463 | 1.646 | 1.532 | 1.179 | 1.513 |
| Permanent total [1] | .203 | .085 | .160 | .065 | .175 | .309 | .147 |
| Permanent partial [2] | 5.221 | 4.333 | 4.279 | 3.853 | 3.692 | 3.652 | 4.000 |
| Temporary [3] | 165.177 | 158.506 | 125.509 | 124.218 | 104.362 | 100.898 | 125.243 |
| Total | 172.372 | 164.558 | 131.411 | 129.782 | 109.761 | 106.038 | 130.903 |
| Average number of 300-day workers per year | 80,858 | 82,609 | 81,325 | 76,559 | 68,531 | 51,755 | 72,156 |

[1] Permanent total disability: Loss of both legs or arms, 1 leg and 1 arm, total loss of eyesight, paralysis, or other condition permanently incapacitating workman from doing any work of a gainful occupation.
[2] Permanent partial disability: Loss of 1 foot, leg, hand or eye, 1 or more fingers, 1 or more toes, any dislocation where ligaments are severed, or any other injury known in surgery to be permanent partial disability.
[3] Disability for more than remainder of day of accident.

TABLE 30.—*Number of men employed, days of labor performed, and number of men killed and injured at all quarries in the United States, 1911 to 1931*

| Year | Average days active | Men employed | | Total man-shifts | Number killed | | Number injured | |
|---|---|---|---|---|---|---|---|---|
| | | Actual number | Equivalent in 300-day workers (calculated) | | Total | Per thousand 300-day workers (calculated) | Total | Per thousand 300-day workers (calculated) |
| 1911 | 228 | 110,954 | 84,417 | 25,325,094 | 188 | 2.23 | 5,390 | 63.85 |
| 1912 | 249 | 113,105 | 93,837 | 28,151,042 | 213 | 2.27 | 6,552 | 69.82 |
| 1913 | 246 | 106,278 | 87,141 | 26,142,237 | 183 | 2.10 | 7,739 | 88.81 |
| 1914 | 233 | 87,936 | 68,187 | 20,456,157 | 180 | 2.64 | 7,836 | 114.92 |
| 1915 | 246 | 100,740 | 82,447 | 24,734,224 | 148 | 1.80 | 9,671 | 117.30 |
| Average for 5 years | 240 | 103,803 | 83,206 | 24,961,751 | 182 | 2.19 | 7,438 | 89.39 |
| 1916 | 253 | 90,797 | 76,457 | 22,937,178 | 173 | 2.26 | 13,427 | 175.62 |
| 1917 | 261 | 82,290 | 71,525 | 21,457,357 | 131 | 1.83 | 13,242 | 185.14 |
| 1918 | 260 | 68,332 | 59,285 | 17,785,504 | 125 | 2.11 | 8,719 | 147.07 |
| 1919 | 253 | 75,505 | 63,794 | 19,138,308 | 123 | 1.93 | 9,199 | 144.20 |
| 1920 | 267 | 86,488 | 77,089 | 23,126,648 | 178 | 2.31 | 11,217 | 145.51 |
| Average for 5 years | 259 | 80,682 | 69,630 | 20,888,999 | 146 | 2.10 | 11,161 | 160.29 |
| Average for 10 years | 249 | 92,243 | 76,418 | 22,925,375 | 164 | 2.15 | 9,299 | 121.69 |
| 1921 | 233 | 77,185 | 59,958 | 17,987,547 | 120 | 2.00 | 10,465 | 174.54 |
| 1922 | 261 | 79,081 | 68,861 | 20,658,338 | 132 | 1.92 | 11,839 | 171.93 |
| 1923 | 276 | 92,455 | 85,153 | 25,545,859 | 143 | 1.68 | 14,990 | 176.04 |
| 1924 | 269 | 94,242 | 84,426 | 25,327,858 | 138 | 1.63 | 14,777 | 175.03 |
| 1925 | 273 | 91,872 | 83,487 | 25,045,955 | 149 | 1.78 | 14,165 | 169.67 |
| Average for 5 years | 263 | 86,967 | 76,377 | 22,913,111 | 136 | 1.78 | 13,247 | 173.44 |
| 1926 | 271 | 91,146 | 82,361 | 24,708,400 | 154 | 1.87 | 13,201 | 160.28 |
| 1927 | 271 | 91,517 | 82,609 | 24,782,561 | 135 | 1.63 | 13,459 | 162.92 |
| 1928 | 272 | 89,667 | 81,325 | 24,397,377 | 119 | 1.46 | 10,568 | 129.95 |
| 1929 | 268 | 85,561 | 76,559 | 22,967,579 | 126 | 1.65 | 9,810 | 128.14 |
| 1930 | 255 | 80,633 | 68,531 | 20,559,372 | 105 | 1.53 | 7,417 | 108.23 |
| Average for 5 years | 268 | 87,705 | 78,277 | 23,483,058 | 128 | 1.64 | 10,891 | 139.13 |
| Average for 10 years | 266 | 87,336 | 77,327 | 23,198,085 | 132 | 1.71 | 12,069 | 156.08 |
| 1931 | 224 | 69,200 | 51,755 | 15,526,503 | 61 | 1.18 | 5,427 | 104.86 |

## UNDERGROUND QUARRIES

Until 1931 the accident statistics of the United States Bureau of Mines did not permit compilation of separate accident rates for all underground quarries; that is, properties at which stone was produced by underground mining methods. Returns received from operating companies for several years preceding 1931 had shown the number of quarry workers employed underground but had not contained separate figures relating to accidents to these employees as distinguished from accidents to men who worked in open quarries. A slight revision of the Bureau's accident-inquiry schedule for 1931 permits publication, for the first time, of accident rates for underground employees at all underground quarries.

Seventy-six underground quarries or mines were in operation in the United States in 1931. Of this number, 58 were mining limestone or cement rock.

The accident-frequency rate per million man-hours of exposure to underground hazards at all underground quarries in the United States in 1931 was 60.83; this rate is based upon 5 fatalities, 259 nonfatal injuries causing disability for more than the remainder of the day on which the accidents occurred, and 4,339,804 man-hours of work. The rate for cement and limestone plants was 61.09 for underground and shaft accidents, and the corresponding rate for marble quarries was 47.45. Tennessee's rate of 16.66 accidents per million man-hours was the lowest shown by operators' reports. In one State for which separate figures cannot be revealed the rate was sufficiently high to make the rate for "all other States" 111.74, as shown in table 31.

Comparative accident rates for underground and shaft accidents at quarries, coal mines, metal mines, and nonmetallic mines are presented in table 31. The figures show that for each of these groups considered as a whole the rate for underground quarries was the lowest. However, within the groups the accident rate for underground iron-ore mining was the lowest and therefore the best of that at any single class of operations.

TABLE 31.—*Accident data for underground quarries and comparative figures for underground mines*

[Data cover underground and shaft operations only]

UNDERGROUND QUARRIES, BY KINDS OF STONE

| | Number of plants | Men employed | Man-shifts worked | Man-hours of exposure | Average days active | Average hours per man | Accidents | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Killed | Injured | Rate per million man-hours |
| Cement and limestone___ | 58 | 2,020 | 362,324 | 3,077,335 | 179 | 1,523 | 3 | 185 | 61.09 |
| Marble_____ | 4 | 421 | 122,933 | 990,539 | 292 | 2,353 | _____ | 47 | 47.45 |
| Sandstone_____ | 4 | 48 | 7,538 | 67,838 | 157 | 1,413 | 2 | 11 | 191.63 |
| Slate_____ | 8 | 103 | 22,060 | 191,996 | 214 | 1,864 | _____ | 16 | 83.34 |
| Granite_____ | 2 | 7 | 1,512 | 12,096 | 216 | 1,728 | _____ | _____ | _____ |
| Total_____ | 76 | 2,599 | 516,367 | 4,339,804 | 199 | 1,670 | 5 | 259 | 60.83 |

TABLE 31.—*Accident data for underground quarries and comparative figures for underground mines*—Continued

UNDERGROUND QUARRIES, BY STATES

| | Num-ber of plants | Men em-ployed | Man-shifts worked | Man-hours of exposure | Aver-age days active | Aver-age hours per man | Accidents | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Killed | Injured | Rate per million man-hours |
| Illinois | 8 | 114 | 31,697 | 274,961 | 278 | 2,412 | | 12 | 43.64 |
| Missouri | 10 | 214 | 49,136 | 462,810 | 230 | 2,163 | | 24 | 51.86 |
| Pennsylvania | 17 | 932 | 129,097 | 1,056,508 | 139 | 1,134 | 3 | 25 | 26.50 |
| Tennessee | 4 | 76 | 22,175 | 180,050 | 292 | 2,369 | 1 | 2 | 16.66 |
| Vermont | 5 | 409 | 120,584 | 969,436 | 295 | 2,370 | | 41 | 42.29 |
| Other States | 32 | 854 | 163,678 | 1,396,039 | 192 | 1,635 | 1 | 155 | 111.74 |
| Total | 76 | 2,599 | 516,367 | 4,339,804 | 199 | 1,670 | 5 | 259 | 60.83 |

UNDERGROUND MINES, BY KINDS OF MINERAL

| | Num-ber of plants | Men em-ployed | Man-shifts worked | Man-hours of exposure | Aver-age days active | Aver-age hours per man | Killed | Injured | Rate per million man-hours |
|---|---|---|---|---|---|---|---|---|---|
| Coal: | | | | | | | | | |
| Bituminous | | 387,693 | 62,926,492 | 510,366,475 | 162 | 1,316 | 1,026 | 50,286 | 100.54 |
| Anthracite | | 109,280 | 19,904,932 | 159,685,407 | 182 | 1,461 | 352 | 23,431 | 148.94 |
| Total | | 496,973 | 82,831,424 | 670,051,882 | 167 | 1,348 | 1,378 | 73,717 | 112.07 |
| Metal: | | | | | | | | | |
| Copper | | 12,602 | 3,206,678 | 25,654,589 | 254 | 2,036 | 48 | 2,160 | 86.07 |
| Iron | | 11,868 | 2,395,369 | 19,925,313 | 202 | 1,679 | 24 | 588 | 30.72 |
| Lead and zinc | | 5,379 | 1,024,006 | 8,246,467 | 190 | 1,533 | 10 | 648 | 79.79 |
| Gold and other | | 15,878 | 4,062,909 | 32,594,782 | 256 | 2,053 | 56 | 3,119 | 97.41 |
| Total, metal | | 45,727 | 10,688,962 | 86,421,151 | 234 | 1,890 | 138 | 6,515 | 76.98 |
| Nonmetal | | 2,596 | 549,532 | 4,678,318 | 212 | 1,802 | 8 | 299 | 65.62 |
| Total metal and non-metal (except coal) | | 48,323 | 11,238,494 | 91,099,469 | 233 | 1,885 | 146 | 6,814 | 76.40 |
| Total underground, all mines and quarries | | 547,895 | 94,586,285 | 765,491,155 | 173 | 1,397 | 1,529 | 80,790 | 107.54 |

## COMPARATIVE ACCIDENT RATES FOR VARIOUS BRANCHES OF THE MINERAL INDUSTRY

The average fatality rate during the calendar year 1931 for all branches of the mineral industry for which the United States Bureau of Mines compiles Nation-wide statistics of lost-time accidents was 1.41 per million man-hours of labor performed, and the average rate for nonfatal injuries was 79.73. By-product coke ovens had the lowest accident-frequency rate covering fatal and nonfatal injuries, and the next best record was that of the cement industry. Accidents per million man-hours of exposure numbered 11.27 for by-product coke ovens and 12.45 for cement mills and quarries. The highest accident-frequency rate was that for coal mines, the returns for this group in 1931 showing 101.71 fatal and nonfatal lost-time injuries per million man-hours of exposure. Metal and nonmetal mines had a combined rate of 41.04; the lowest rate within this group was 20.50 for iron mines. Quarrying and related work outside the quarries had a combined accident rate of 41.04; this figure is the average of a rate of 61.12 for operations at the quarries proper and 26.43 for crushing plants, cement mills, limekilns, and stone-dressing plants.

These rates are shown in table 32, which also contains, figures indicating the number of men employed and the number of man-hours of exposure for each branch of the mineral industry in 1931.

TABLE 32.—*United States: Accident data, including rates for different branches of mineral industries in 1931*

| Industry | Average days active | Men employed | Man-shifts | Man-hours | Killed | Injured | Killed per million man-hours | Injured per million man-hours |
|---|---|---|---|---|---|---|---|---|
| Coal mines | 168 | 589, 705 | 99, 264, 019 | 804, 394, 130 | 1, 463 | 80, 349 | 1. 82 | 99. 89 |
| All metal mines | 231 | 80, 940 | 18, 721, 486 | 156, 177, 859 | 158 | 8, 709 | 1. 01 | 55. 76 |
| Copper | 258 | 19, 687 | 5, 075, 862 | 41, 019, 314 | 51 | 2, 580 | 1. 24 | 62. 90 |
| Gold, silver, and miscellaneous | 248 | 24, 343 | 6, 038, 686 | 48, 632, 722 | 58 | 3, 825 | 1. 19 | 78. 65 |
| Iron | 202 | 21, 786 | 4, 407, 700 | 39, 121, 025 | 28 | 774 | . 72 | 19. 78 |
| Lead and zinc (Mississippi Valley) | 189 | 6, 175 | 1, 170, 110 | 9, 463, 502 | 10 | 689 | 1. 06 | 72. 81 |
| Nonmetallic mineral | 227 | 8, 949 | 2, 029, 128 | 17, 941, 296 | 11 | 841 | . 61 | 46. 88 |
| All quarries | 224 | 69, 200 | 15, 526, 503 | 133, 750, 124 | 61 | 5, 427 | . 46 | 40. 58 |
| Cement rock | 269 | 18, 456 | 4, 956, 900 | 43, 948, 493 | 10 | 537 | . 23 | 12. 22 |
| Granite | 220 | 9, 439 | 2, 077, 279 | 16, 678, 464 | 6 | 1, 110 | . 36 | 66. 55 |
| Limestone | 201 | 28, 233 | 5, 676, 936 | 48, 559, 283 | 34 | 2, 639 | . 70 | 54. 35 |
| Marble | 278 | 4, 654 | 1, 292, 235 | 11, 336, 684 | 1 | 344 | . 09 | 30. 34 |
| Sandstone and bluestone | 172 | 2, 796 | 480, 086 | 4, 239, 865 | 6 | 204 | 1. 42 | 48. 11 |
| Slate | 192 | 2, 361 | 453, 154 | 3, 914, 050 | 1 | 230 | . 26 | 58. 76 |
| Trap rock | 181 | 3, 261 | 589, 913 | 5, 053, 285 | 3 | 363 | . 59 | 71. 55 |
| In and about quarry | 198 | 33, 221 | 6, 578, 430 | 56, 280, 488 | 50 | 3, 390 | . 89 | 60. 23 |
| In outside works | 249 | 35, 979 | 8, 948, 073 | 77, 469, 636 | 11 | 2, 037 | . 14 | 26. 29 |
| Metallurgical plants | 299 | 28, 938 | 8, 641, 868 | 70, 373, 642 | 16 | 1, 393 | . 23 | 19. 79 |
| Ore-dressing plants | 260 | 8, 867 | 2, 309, 645 | 18, 934, 699 | 6 | 439 | . 32 | 23. 18 |
| Smelters | 315 | 11, 993 | 3, 778, 420 | 30, 411, 110 | 6 | 601 | . 20 | 19. 76 |
| Auxiliary works | 316 | 8, 078 | 2, 553, 803 | 21, 027, 833 | 4 | 353 | . 19 | 16. 79 |
| All coke ovens | 350 | 15, 564 | 5, 448, 923 | 44, 574, 281 | 9 | 534 | . 20 | 11. 98 |
| Beehive | 175 | 1, 095 | 191, 224 | 1, 609, 295 | 1 | 58 | . 62 | 36. 04 |
| By-product | 363 | 14, 469 | 5, 257, 699 | 42, 964, 986 | 8 | 476 | . 19 | 11. 08 |
| Total | 188 | 784, 347 | 147, 602, 799 | 1,209,270,036 | 1, 707 | 96, 412 | 1. 41 | 79. 73 |

○